Reference for checking if a power supply is hooked up to Snake and Rotator Magnets correctly by using signals on the quench detection pages

- **Read pet page procedure on page 2 first.**
- **If you want to use q.d. slow logs see the procedure starting on page 35.**
- **The pet page procedure is the recommended way to go if you can ramp the p.s.'s.**

Quench Detector Pet Pages

Procedure for Polarity Checking using pet page (gas cooled leads)

1) Bring up the quench detector page you need.
2) The first thing you must do is make sure the slow log is set to 1 minute. This is a box on the left hand side of the qd page under the words "Operating Mode". Click on the box under "Operating Mode" and select "slog 1m". See page 4. If it is already set to 1 minute you don't have to do anything with this. Make sure every qd page you work with has this set to 1 minute.
3) Ramp only one power supply at a time. So if you are working on bo3-snk7-1.4 and bo3-snk7-2.3 start with bo3-snk7-1.4 and ramp it by itself. Five amps should be enough but the pictures that follow show real operating currents on the qd pet pages.
4) On page 4 you can see the current circled on the left hand side and the gas cooled leads circled on the right hand side. You can look at the –ps or –psd for the current signal. They are both the same. When you are ramping up to 5 amps with bo3-snk7-1.4 you should see:
    a. the B1 and R1 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current.
    b. the B4 and R4 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current.
    c. the polarity of the gas cooled leads should be just as shown on page 4 and then you know the polarity is correct. If you see there is a wrong polarity or the gas cooled leads are not opposite as they should be there is a problem.
5) If this was a 2.3 p.s. then:
    a. B2 and R2 gas cooled leads should always be opposite sign but equal and increasing only as you are ramping up in current.
    b. B3 and R3 gas cooled leads should always be opposite sign but equal and increasing only as you are ramping up in current.
6) When you ramp down the p.s. the gas cooled leads should follow, check this too.
7) You should also watch that the voltage on the gas cooled leads are not slowly, or quickly, drifting up, when you are sitting at a fixed current. This could indicate a lead flow problem. If the flow is low the voltage would climb and eventually the qd would trip out the p.s.

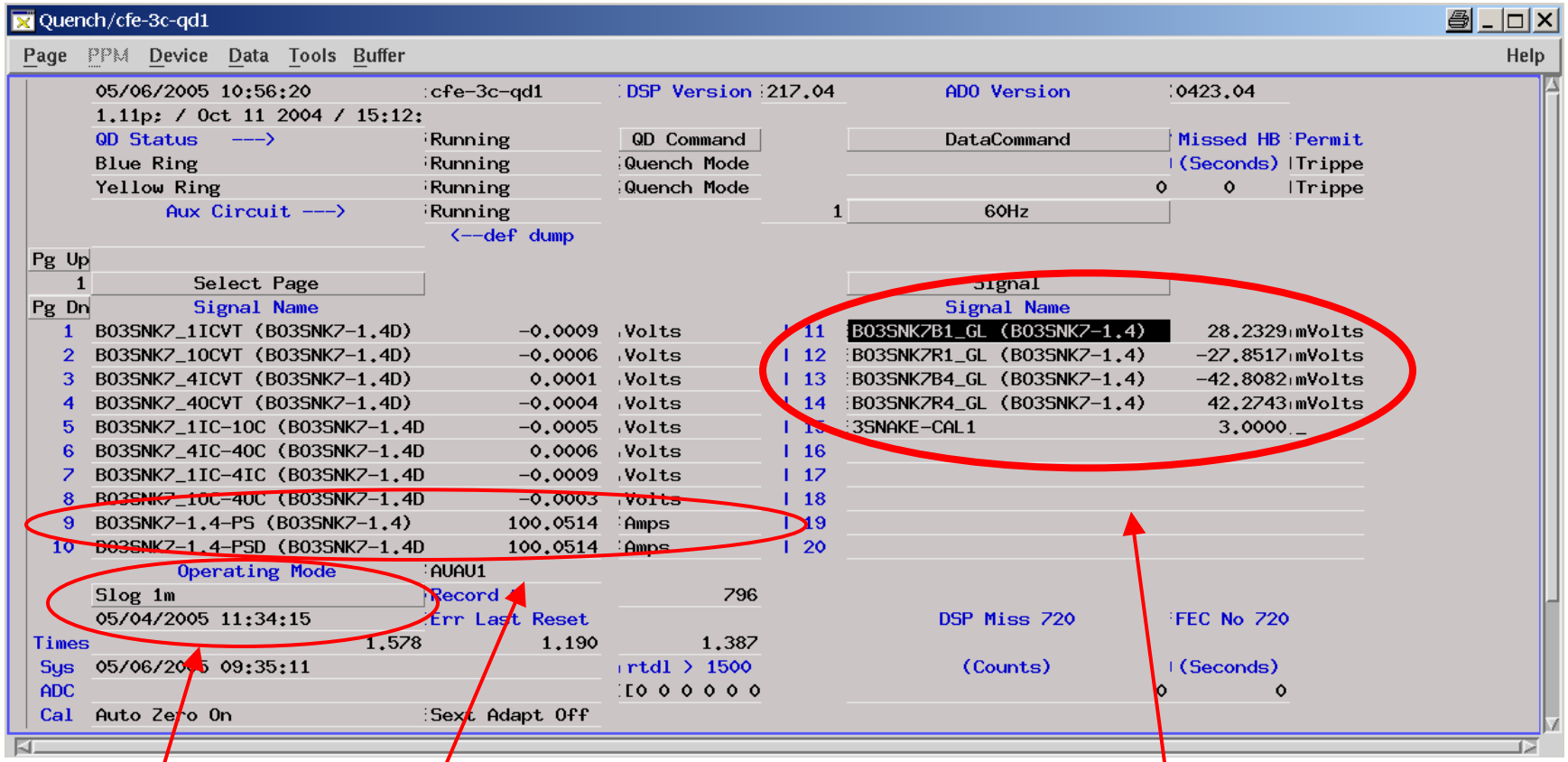
Procedure for Coil Voltage Tap Checkout using pet page

1) Again, let's use bo3-snk7-1.4 as an example so bring up the quench detector page for this snake p.s. MAKE SURE SLOW LOGS = 1MIN.
2) Ramp only one power supply at a time. So if you are working on bo3-snk7-1.4 and bo3-snk7-2.3. Start with bo3-snk7-1.4 and ramp it by itself. Five amps should be enough but the pictures that follow show operating currents.
3) See page 5 and page 6. You need to look at the 4 coil voltage taps in the red square on page 5. You also need to look at the difference coils in the red square on page 6. When you are ramping up THE BI9-SNK7-1.4 to 5 amps BY ITSELF this is what you look for
    a. You should see the 2 inner coils (…ICVT) ramp up and be equal to each other (see page 5 for real names).
    b. The 2 outer coils (…OCVT) should ramp up and be equal to each other (see page 5 for real names).
    c. Both the ICVT's and the OCVT's should be close to zero when the di/dt=0 (as shown now on page 5).
    d. On page 6 you will see a square box around the 4 difference coils (IC-OC). When you are ramping up to 5 amps, or sitting at a fixed current, or ramping down, you should see these difference coils are always close to zero. Close to zero means less than 40mV.
4) When you ramp the p.s. down this is what you should look for:
    a. You should see the 2 inner coils (…ICVT) ramp down and be equal to each other.
    b. The 2 outer coils (…OCVT) should ramp down and be equal to each other.
    c. Both the ICVT's and the OCVT's should be close to zero when the di/dt=0.
    d. On page 6 you will see a square box around the 4 difference coils (IC-OC). When you are ramping up to 5 amps, or sitting at a fixed current, or ramping down, you should see these difference coils are always close to zero. Close to zero means less than 40mV.

ALCOVE 3C-SNAKES

Bo3-snk7-1.4-ps

POLARITY CHECKOUT



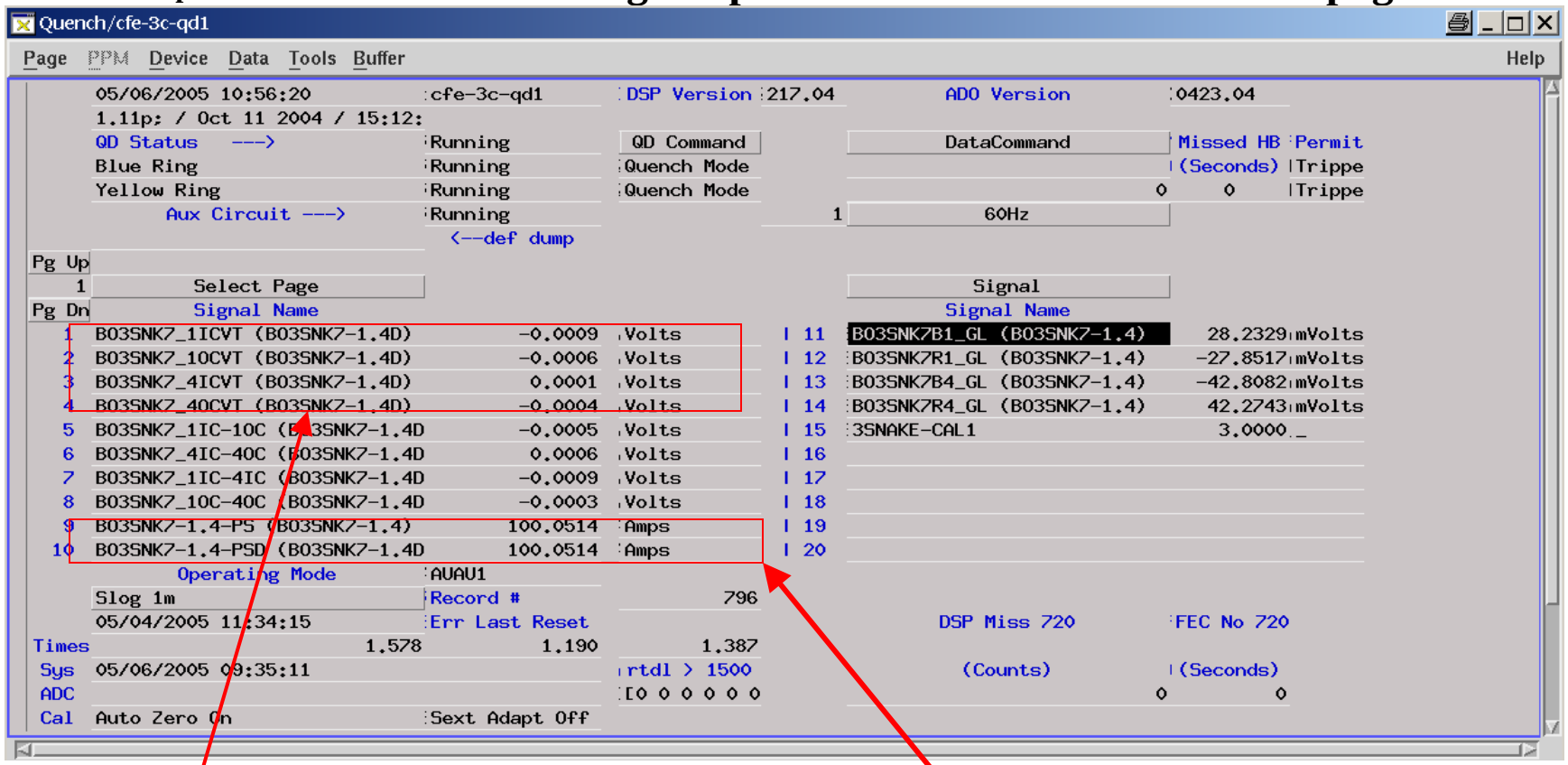
Before you start make sure slow log is set to 1 minute as is shown here.

Current right now.

Voltage and POLARITY of gas cooled leads at this current. If the polarity you see, in real time, matches this polarity then the p.s. leads are hooked up correctly to the magnet.

Bo3-snk7-1.4-ps

Coil Voltage Tap Checkout – continued on next page

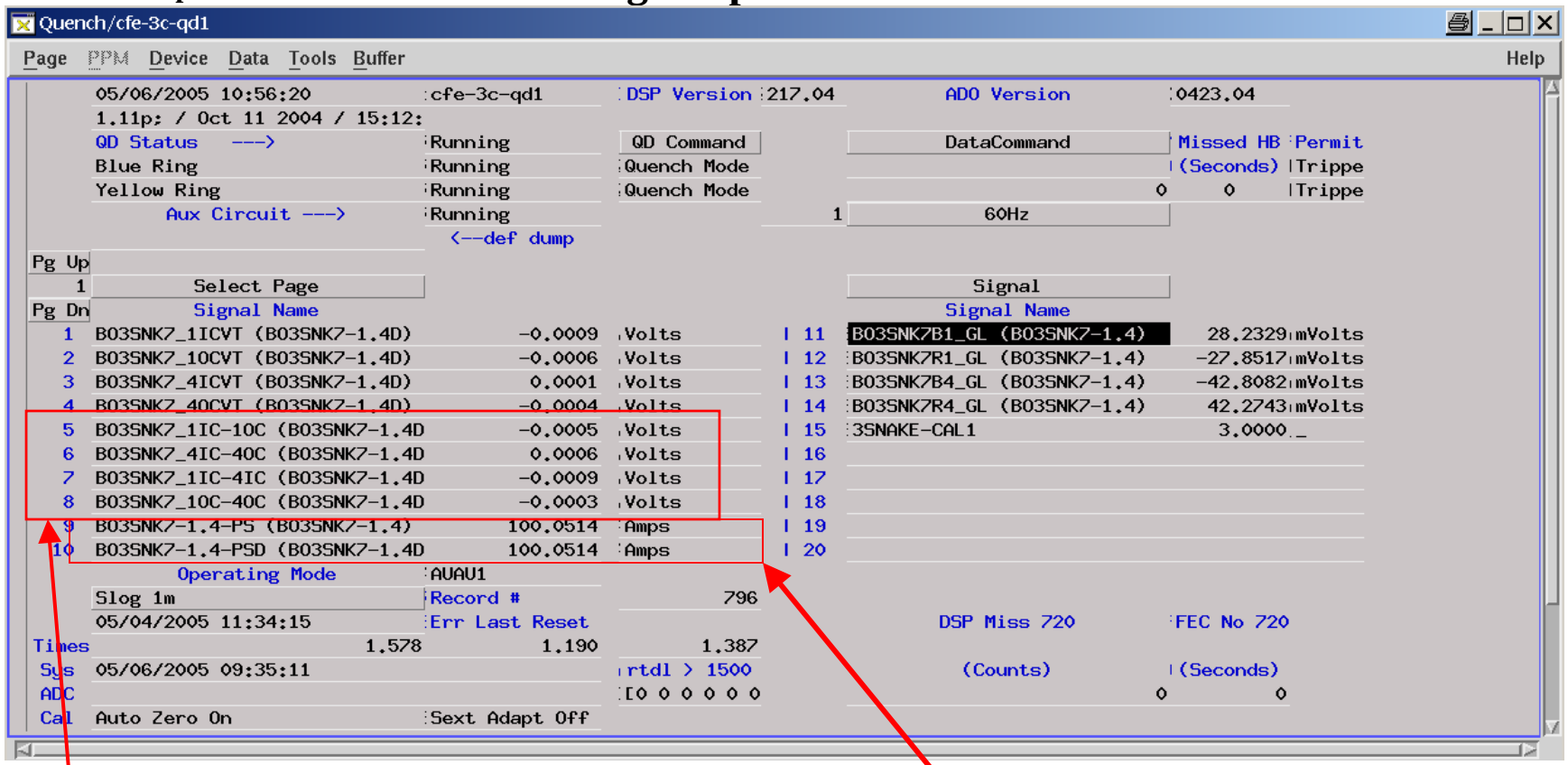


Four Coil Voltage taps to look at. When you are ramping up the 1.4 by itself you should see the 2 IC's ramp up and be equal. The 2 OC's should ramp up and be equal. Both the IC's and the OC's should be close to zero when the di/dt=0. When you ramp the p.s. down you should see the 2 IC's ramp down and be equal. The 2 OC's should ramp down and be equal. Both the IC's and the OC's should be close to zero when the di/dt=0.

This is the current you watch when ramping up. Going up to 5amps is enough.

Bo3-snk7-1.4-ps

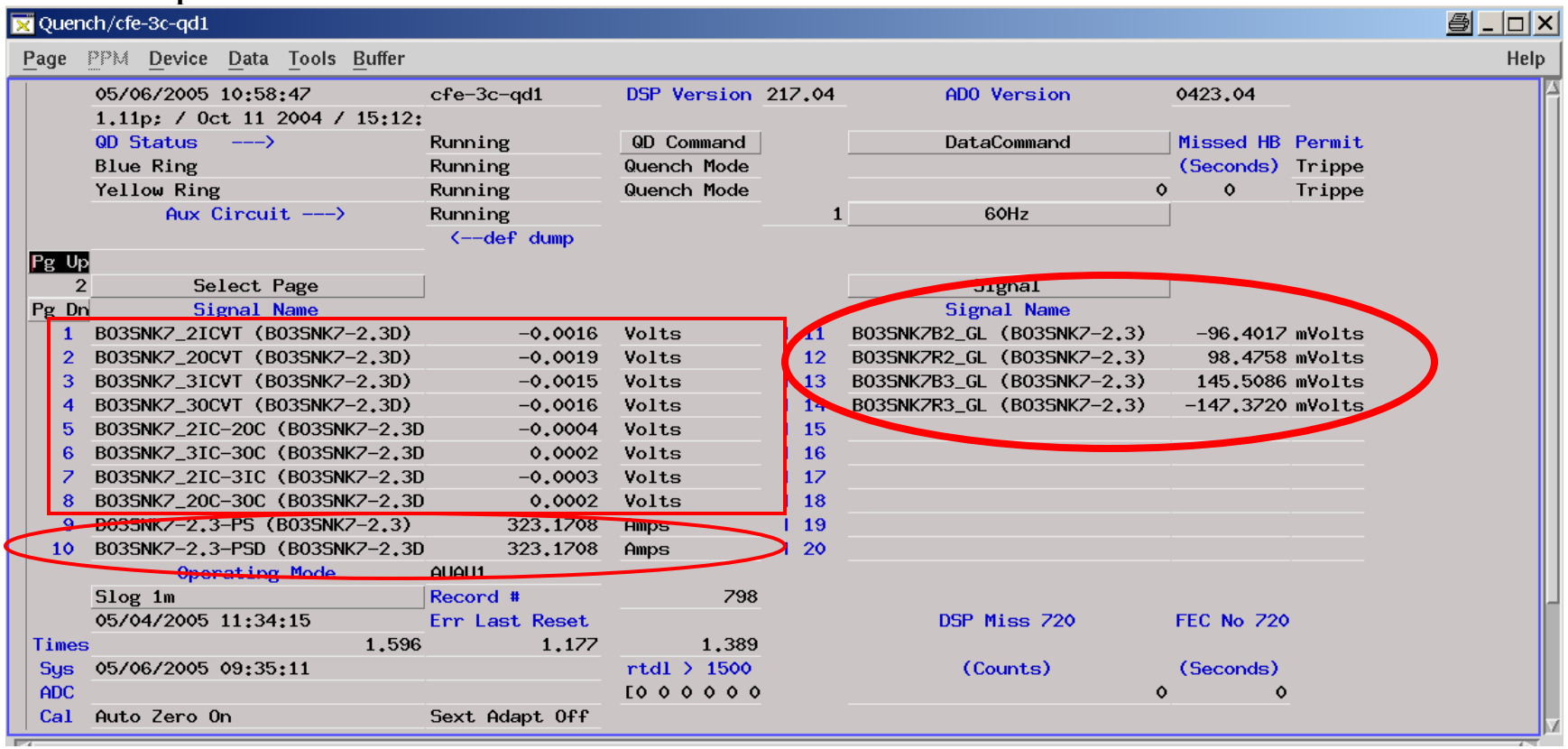
Coil Voltage Tap Checkout



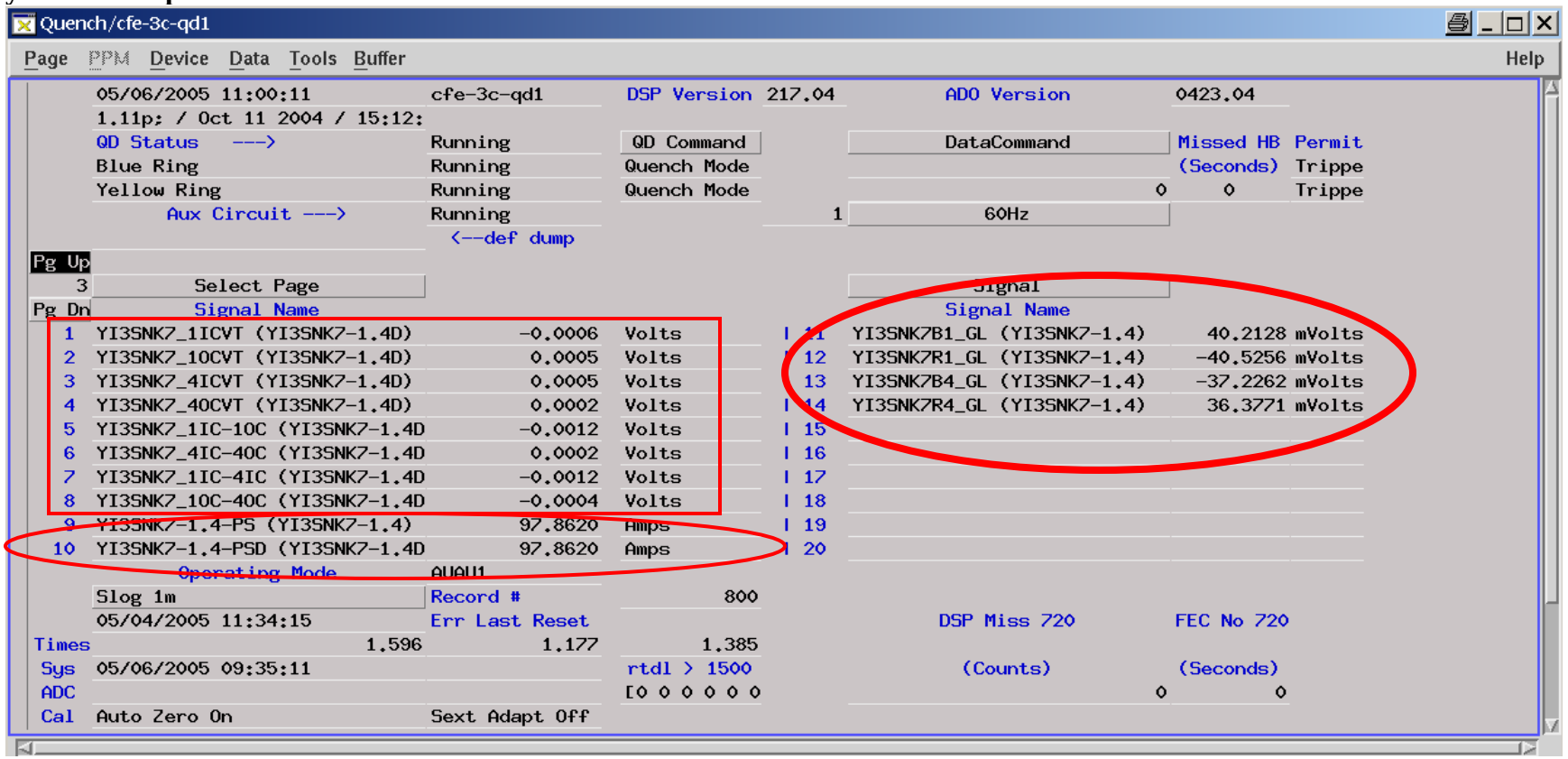
Four Difference Coils to look at. These should always be 40mV or less when you are ramping and even when you are not ramping.

This is the current you watch when ramping up. Going up to 5amps is enough. The –PS and –PSD signals are the same. Use either one.

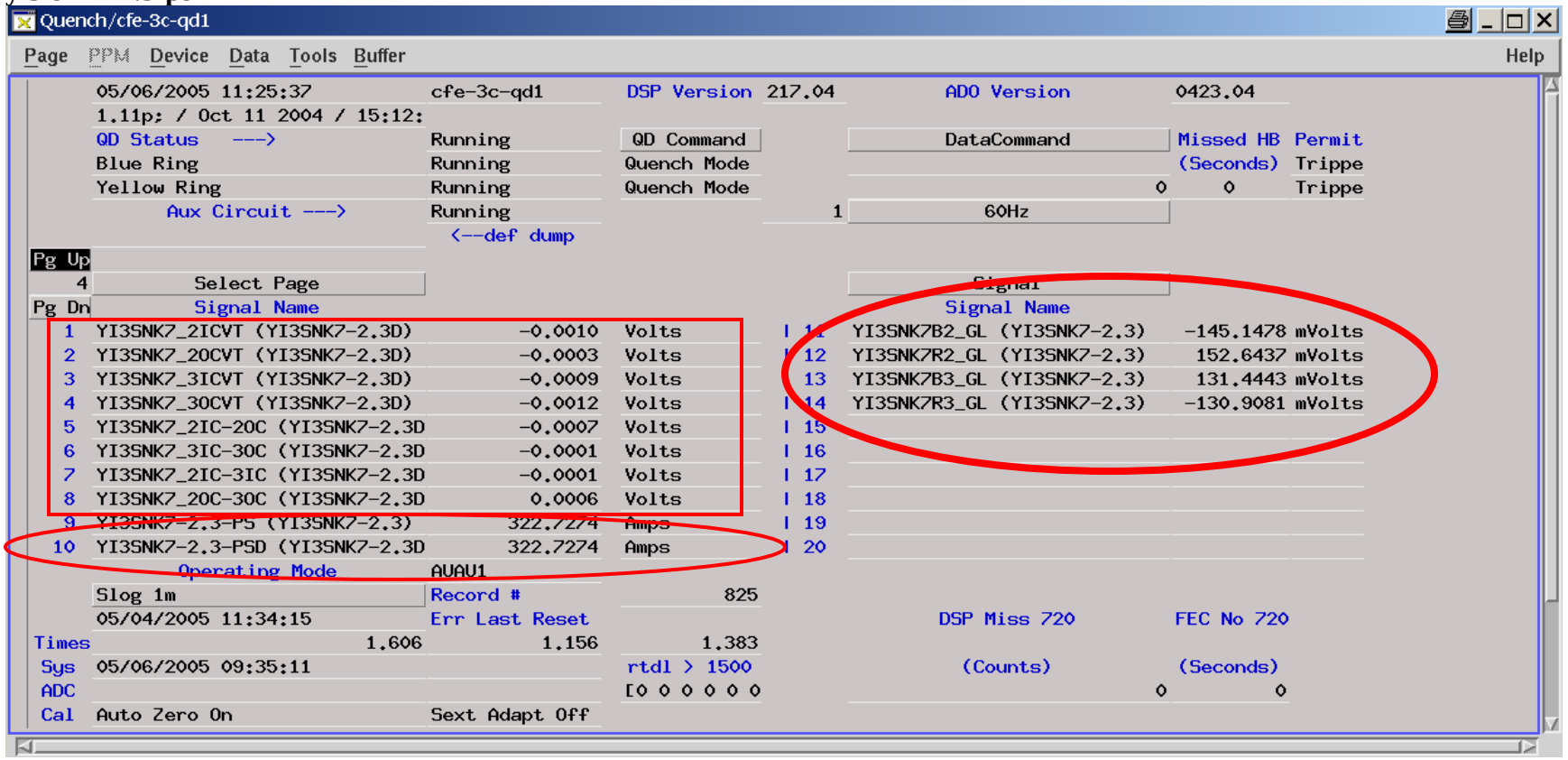
Bo3-snk7-2.3-ps



yi3-snk7-1.4-ps

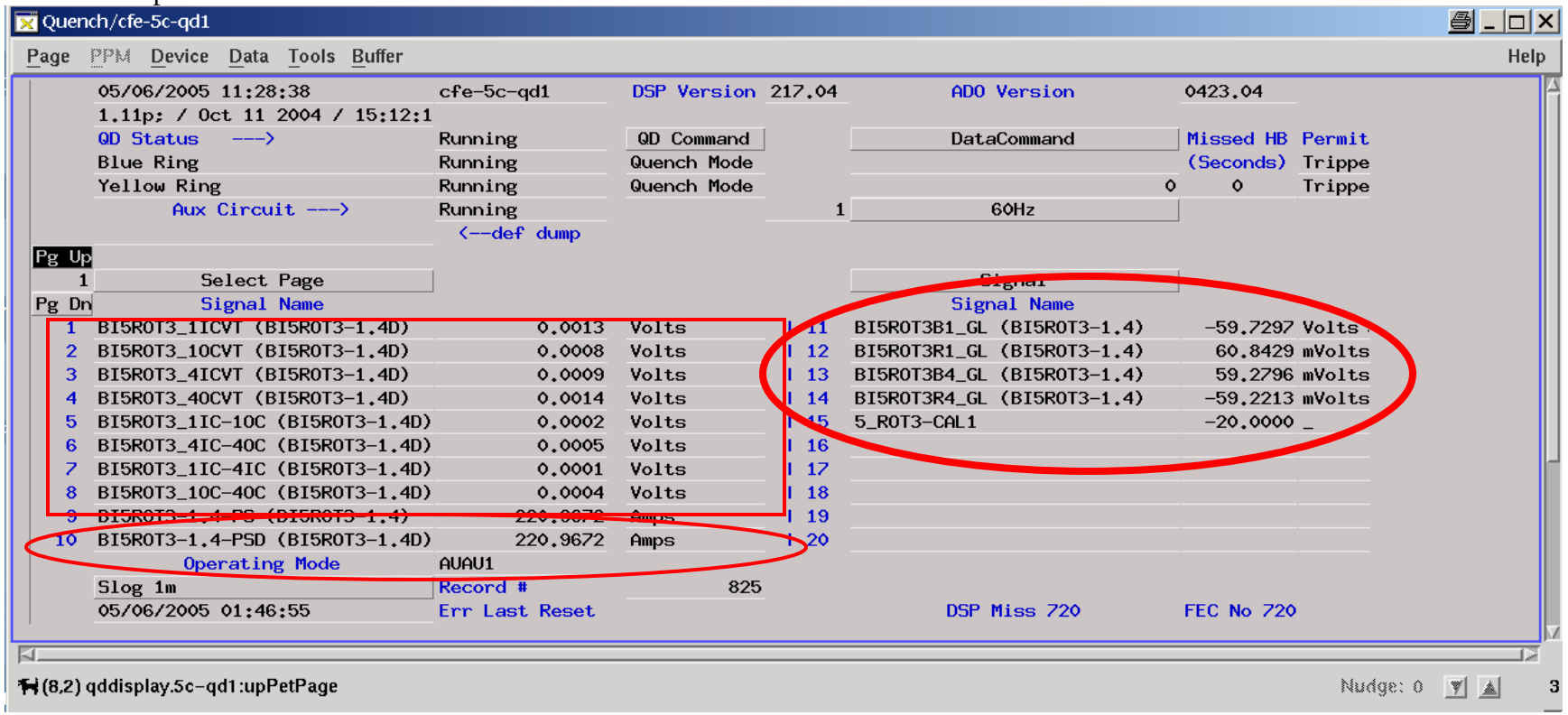


yi3-snk7-2.3-ps

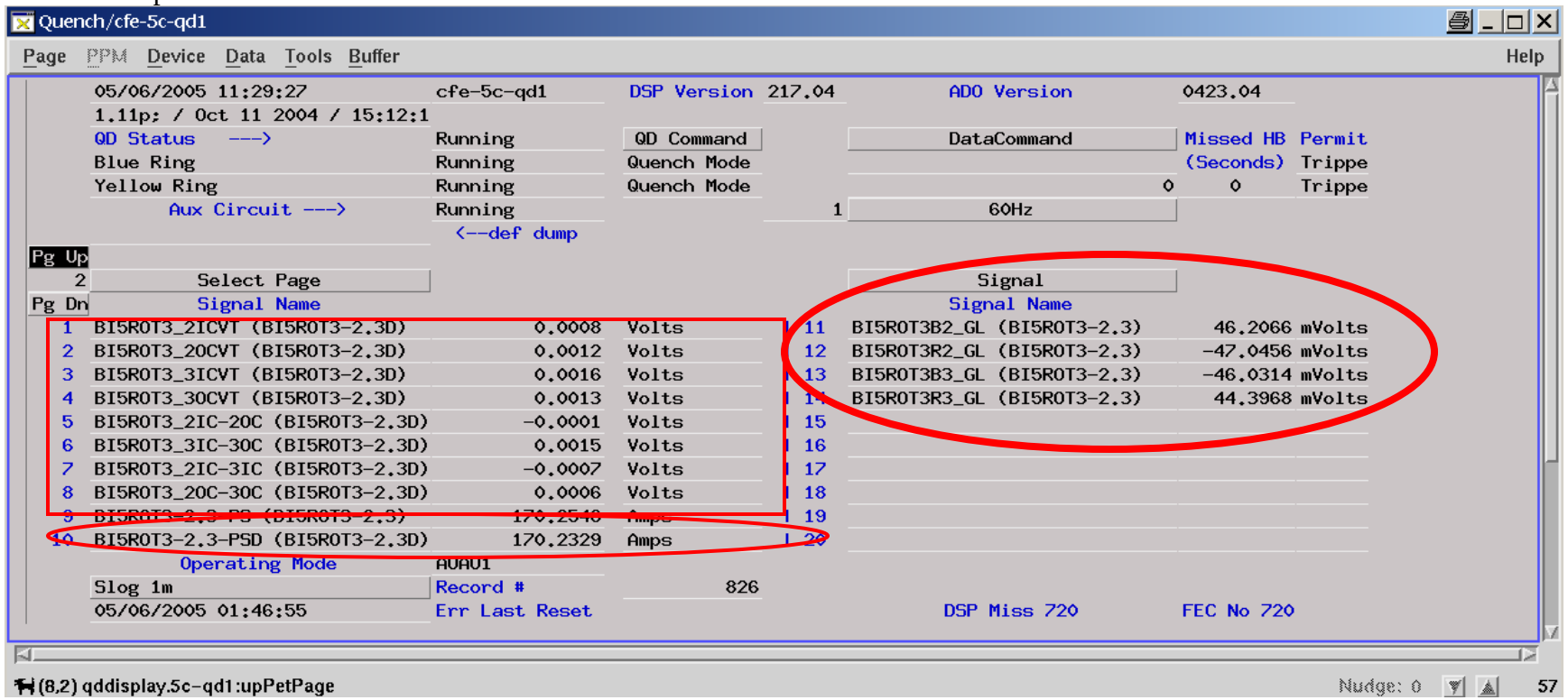


ALCOVE 5C-ROTATORS

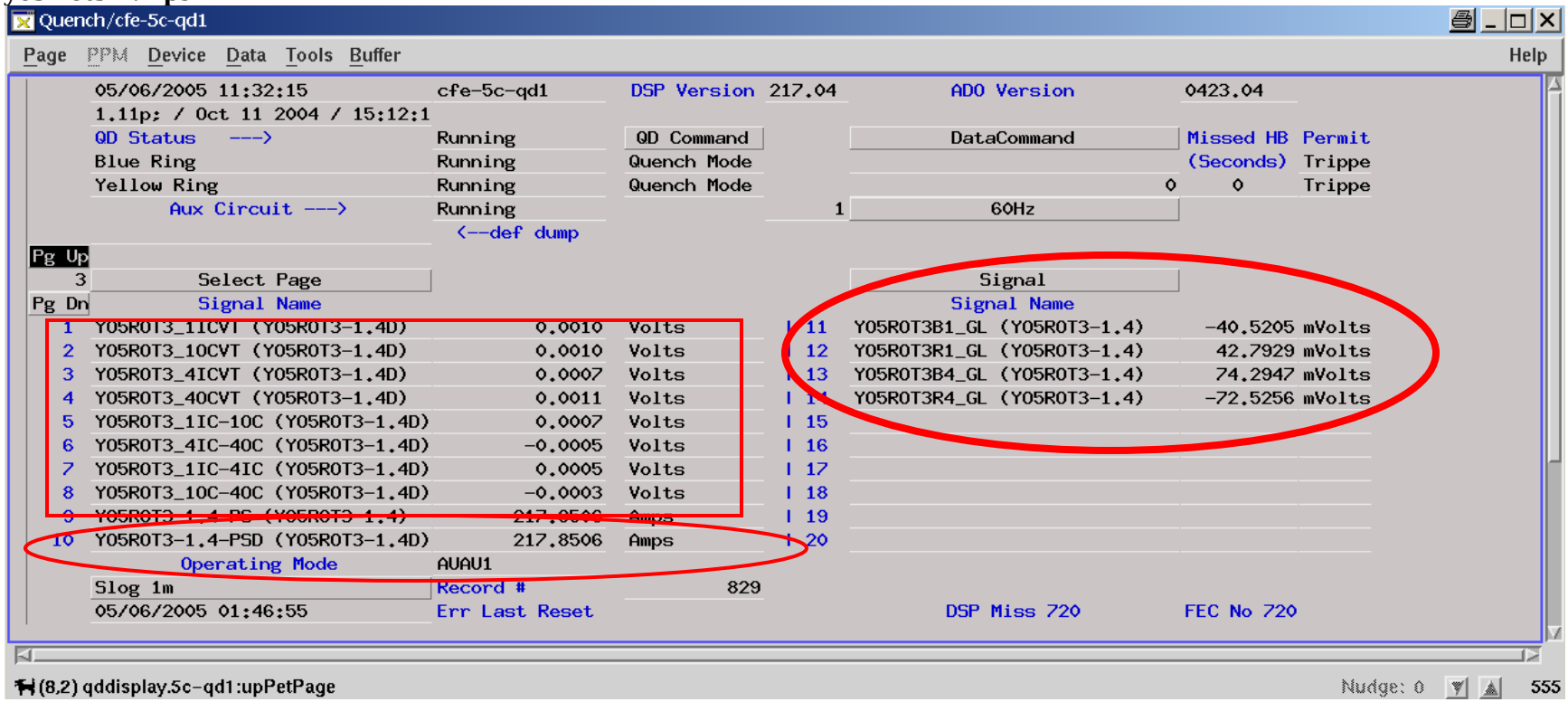
bi5-rot3-1.4-ps



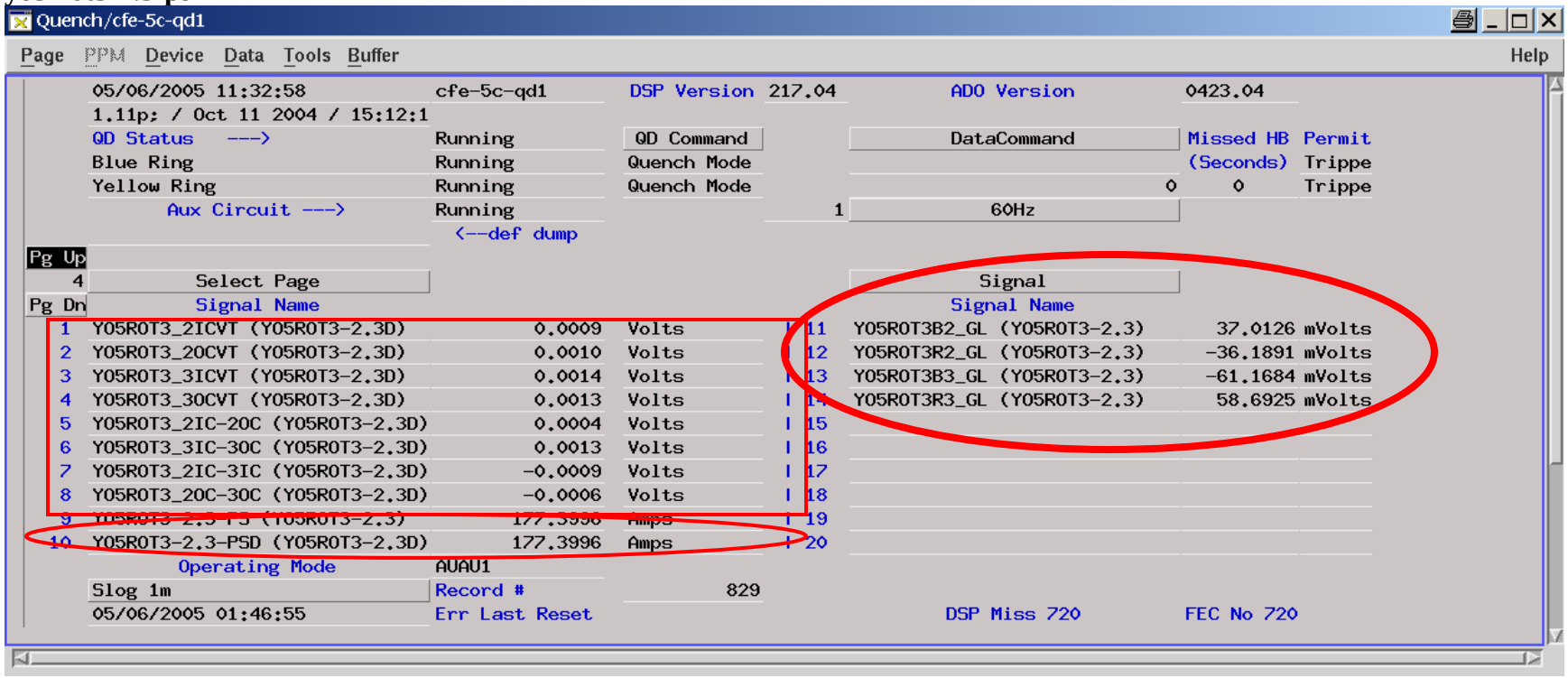
bi5-rot3-2.3-ps



yo5-rot3-1.4-ps

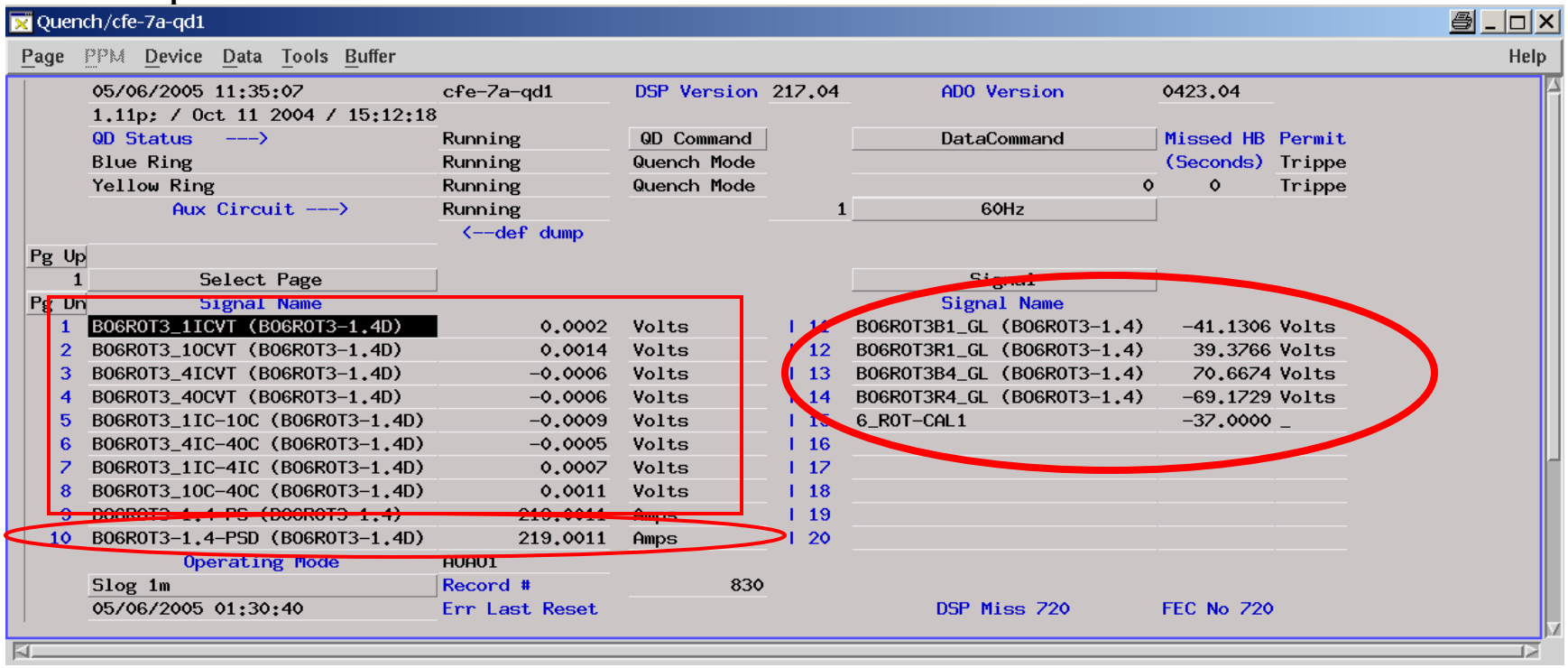


yo5-rot3-2.3-ps

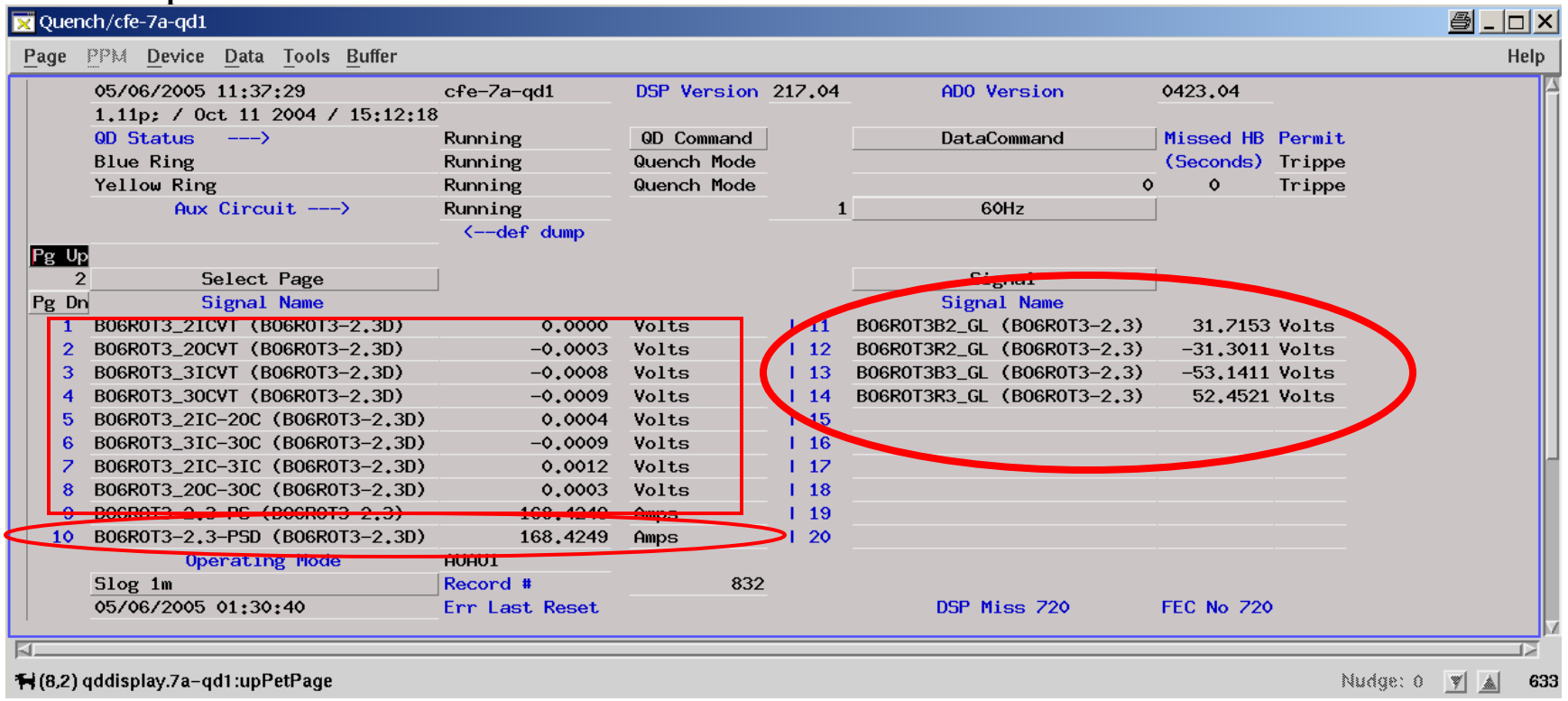


ALCOVE 7A-ROTATORS

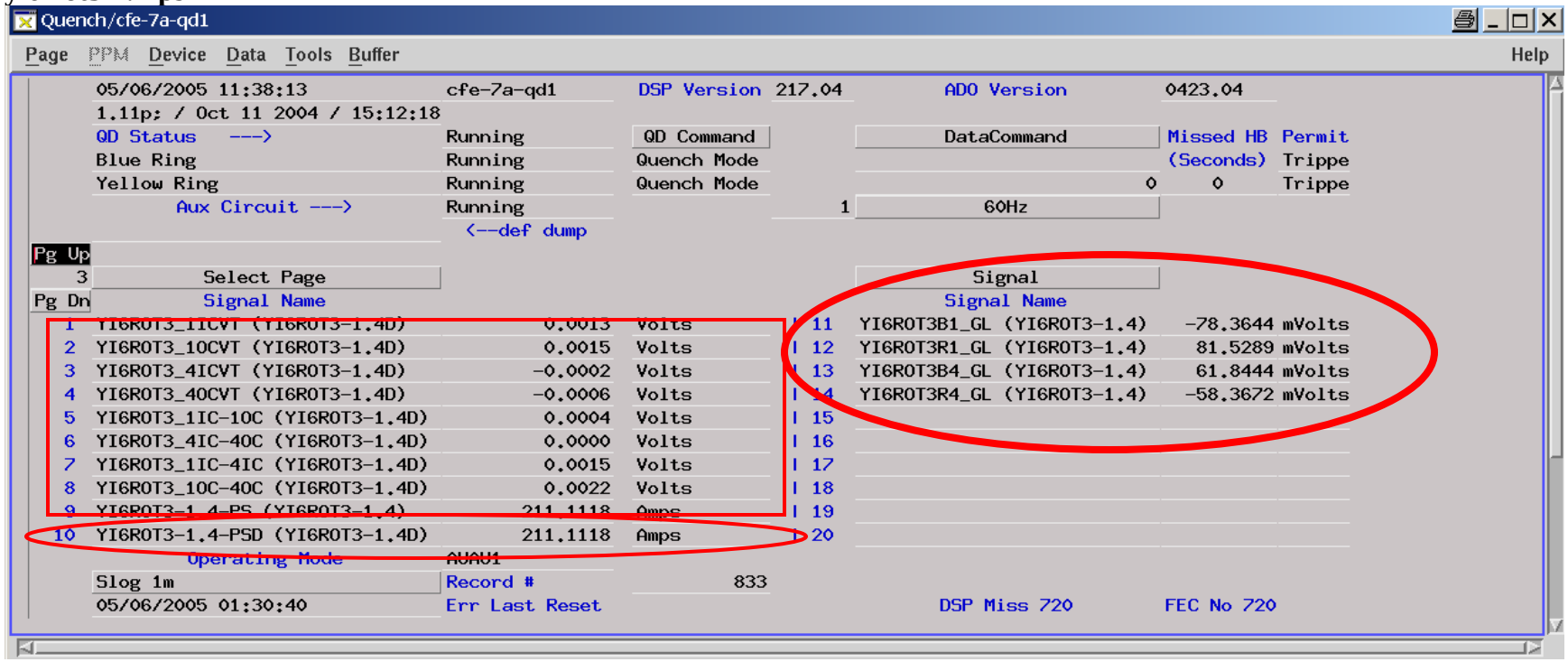
Bo6-rot3-1.4-ps



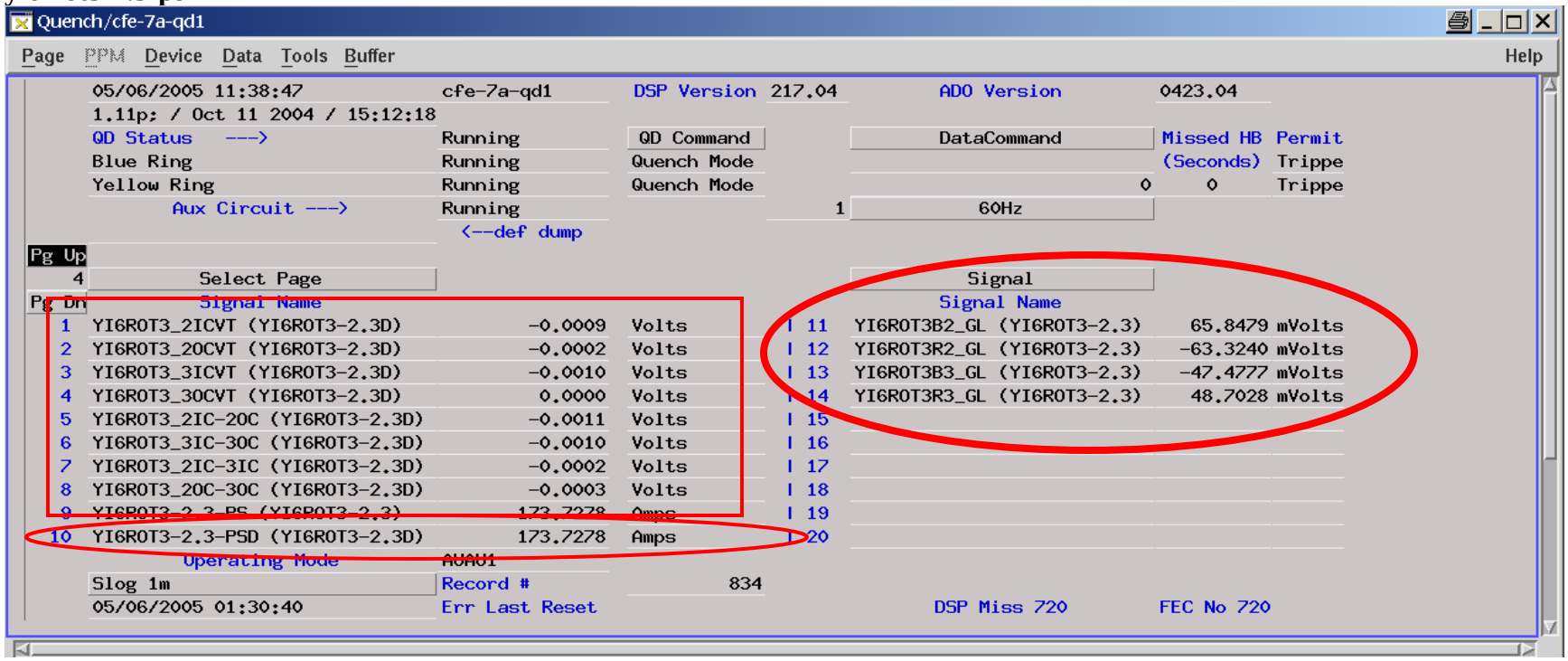
bo6-rot3-2.3-ps



yi6-rot3-1.4-ps

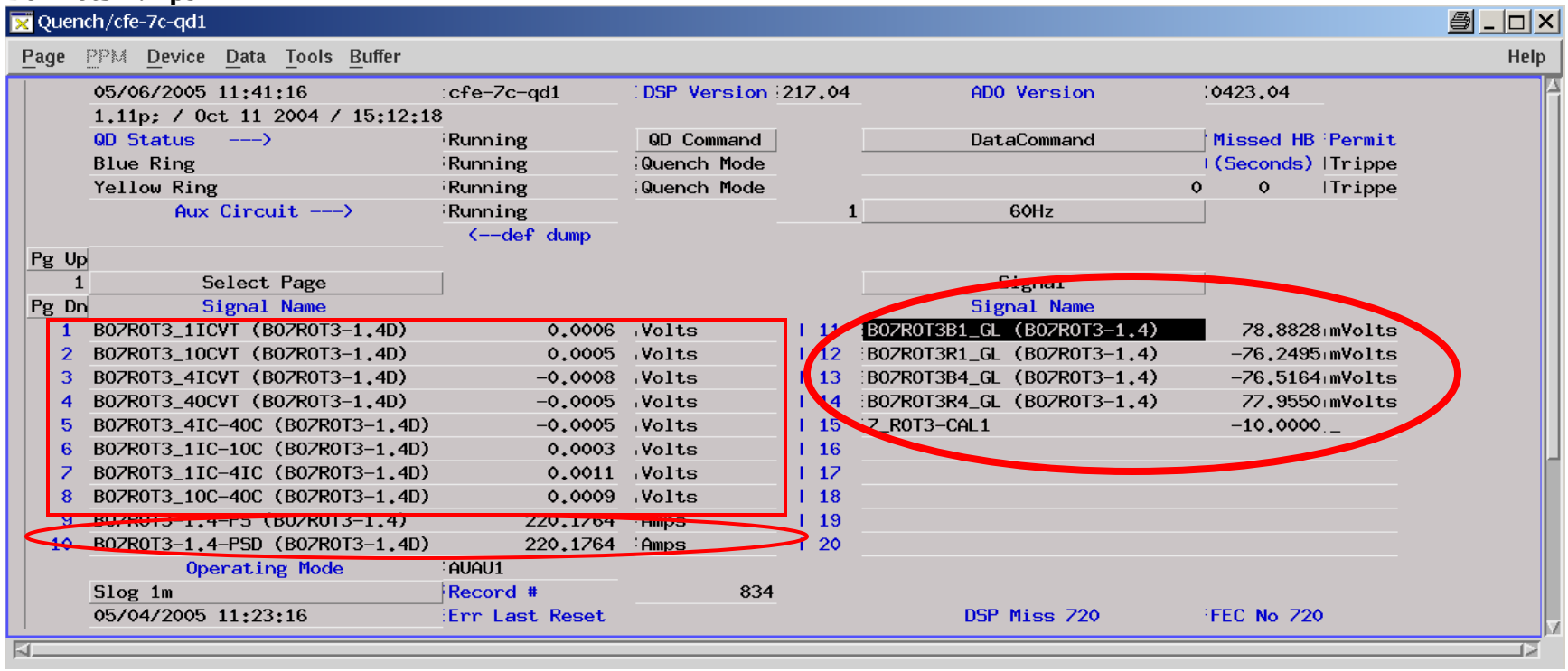


yi6-rot3-2.3-ps

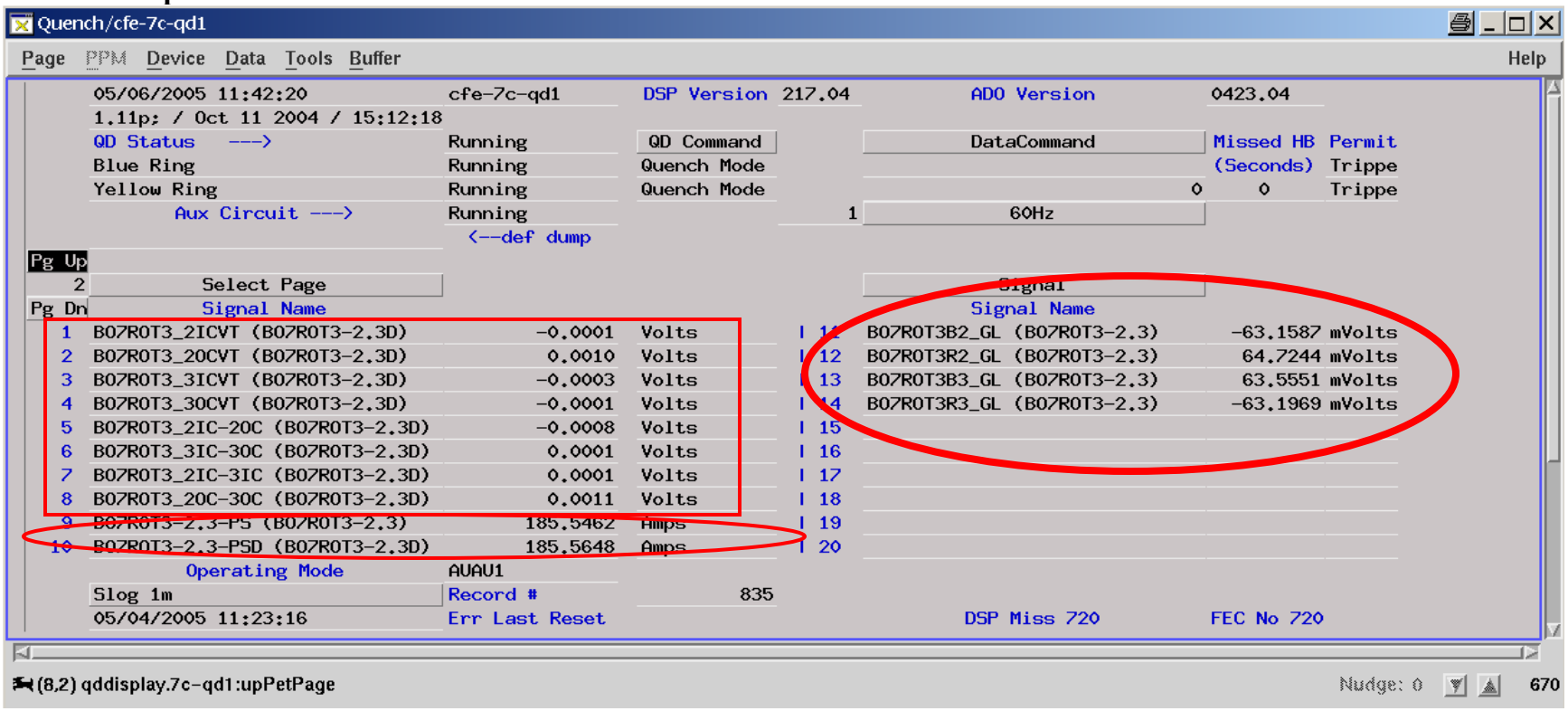


ALCOVE 7C-ROTATORS

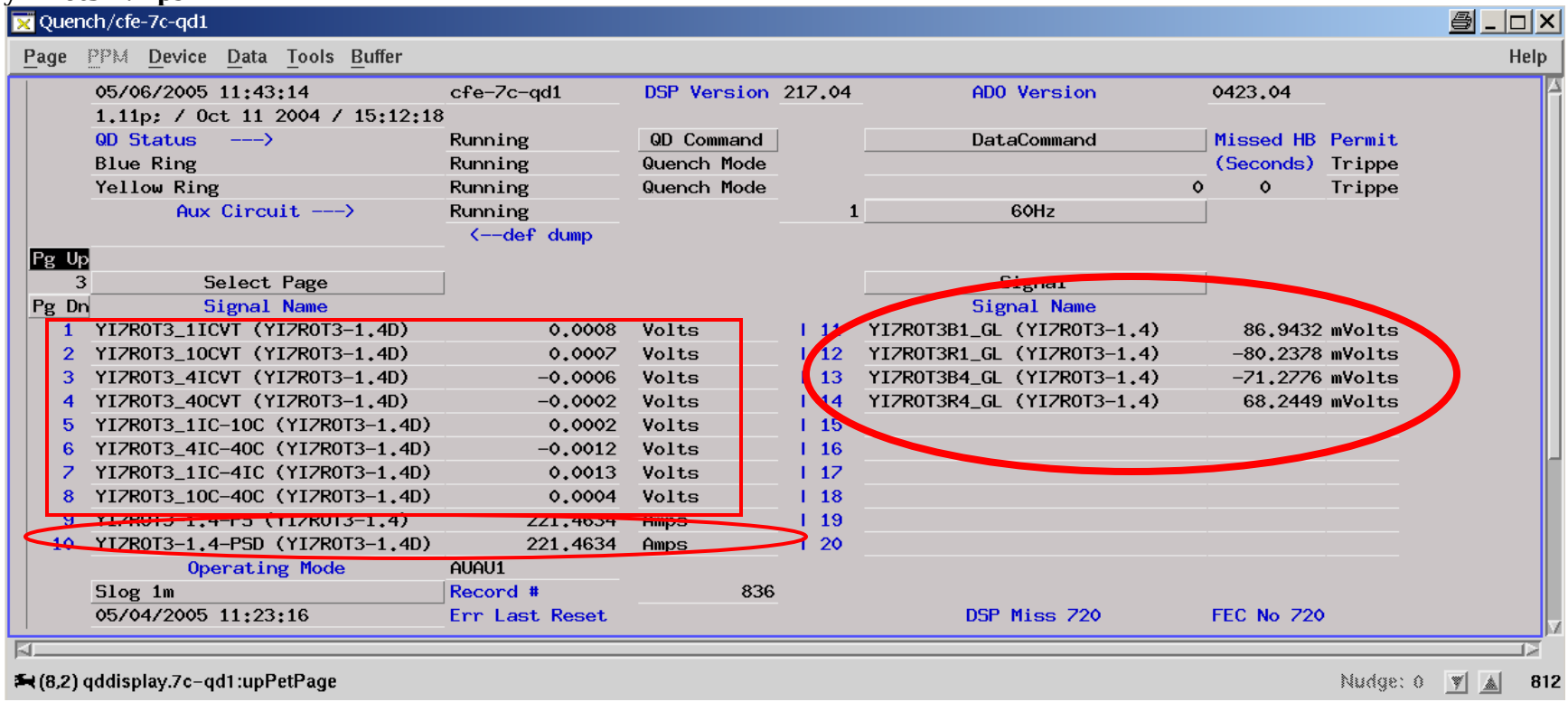
Bo7-rot3-1.4-ps



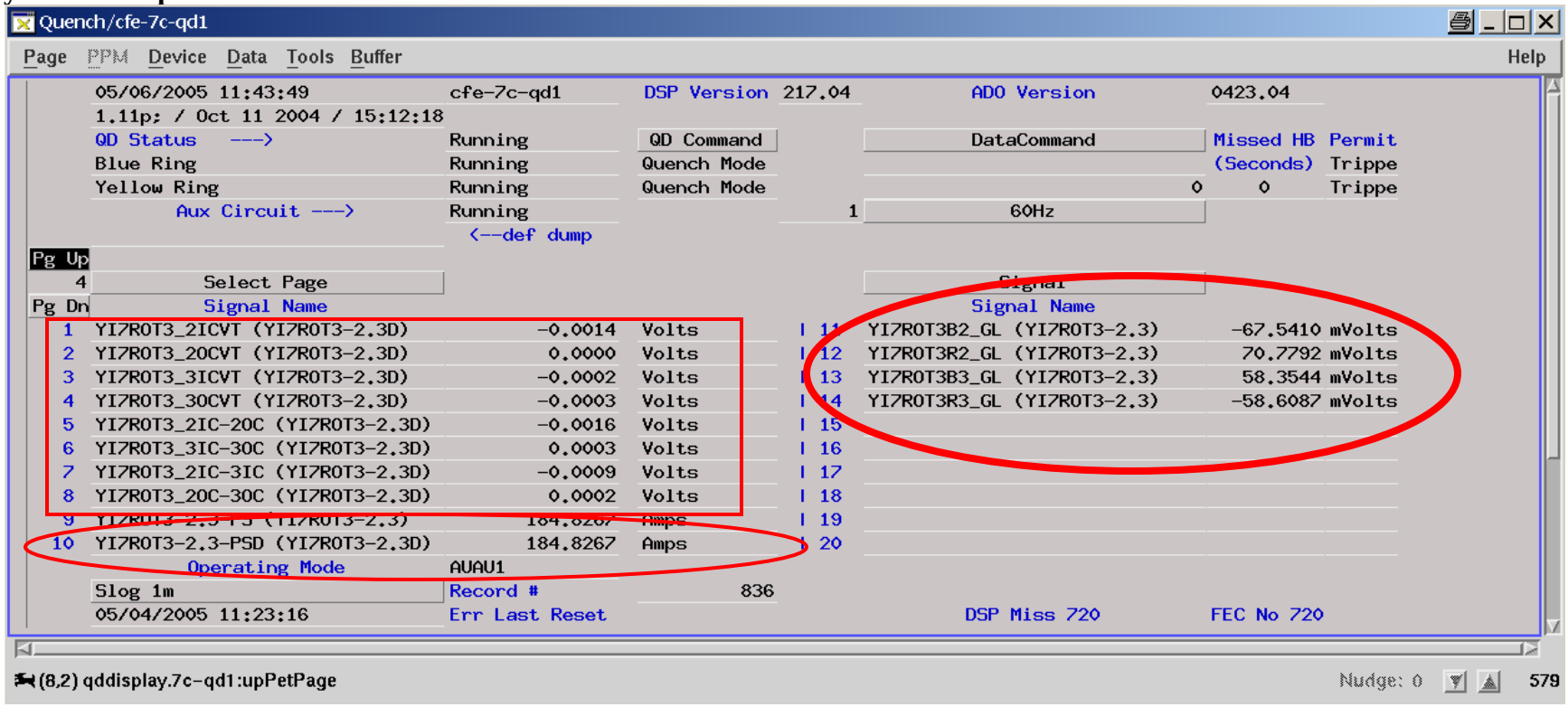
bo7-rot3-2.3-ps



yi7-rot3-1.4-ps

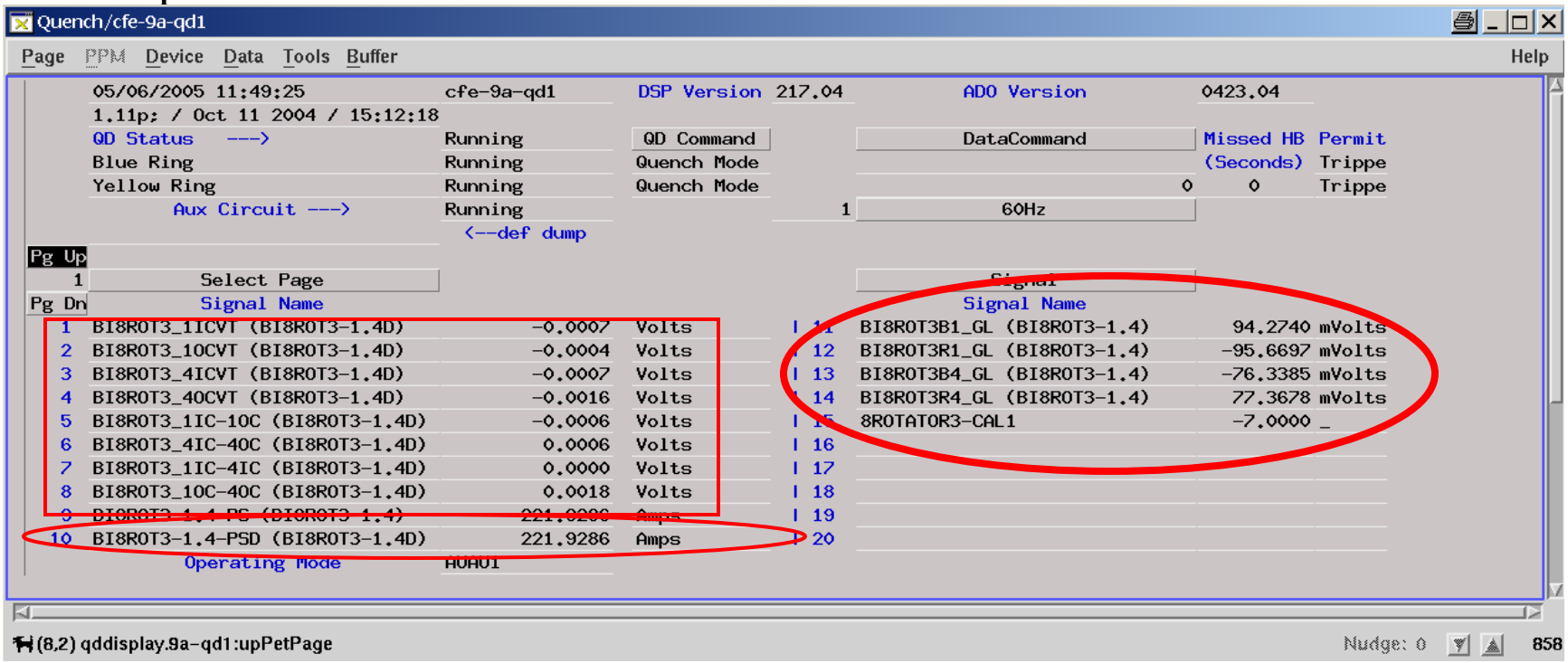


yi7-rot3-2.3-ps

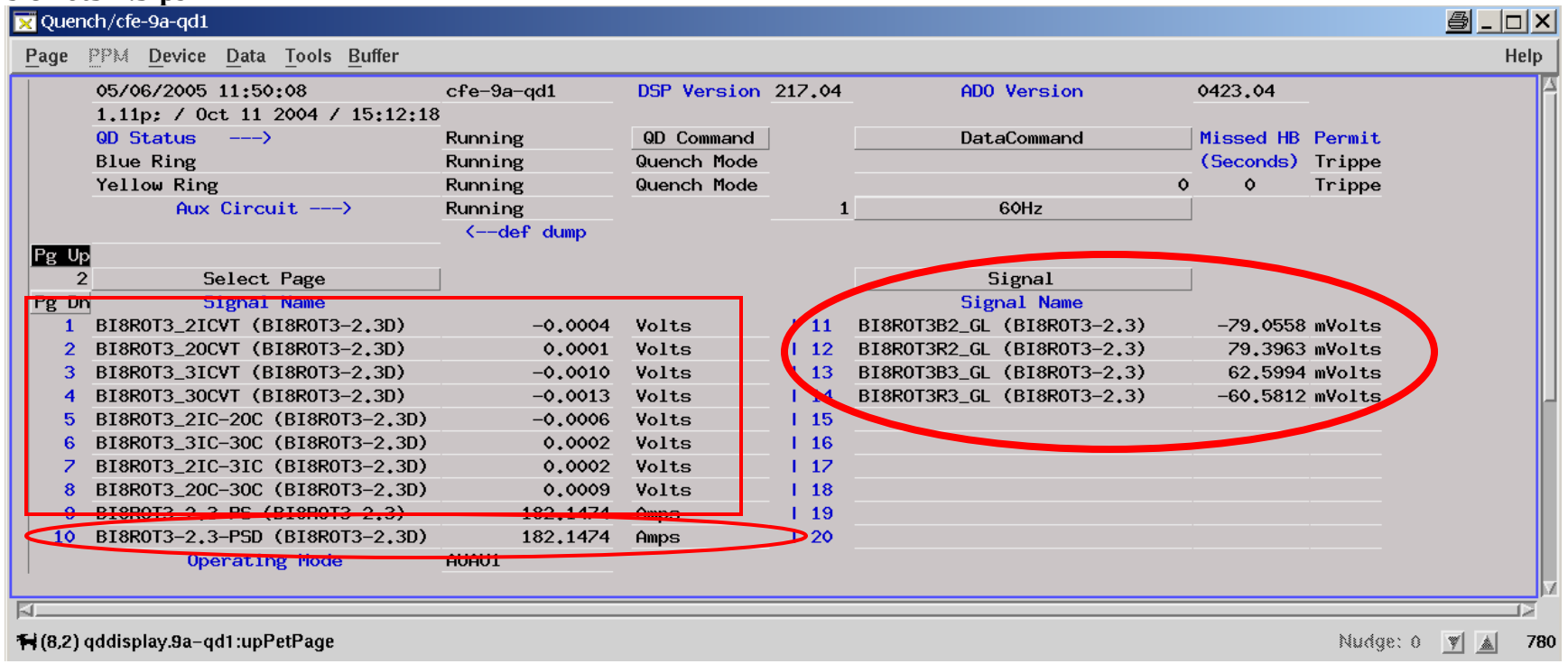


ALCOVE 9A-ROTATORS

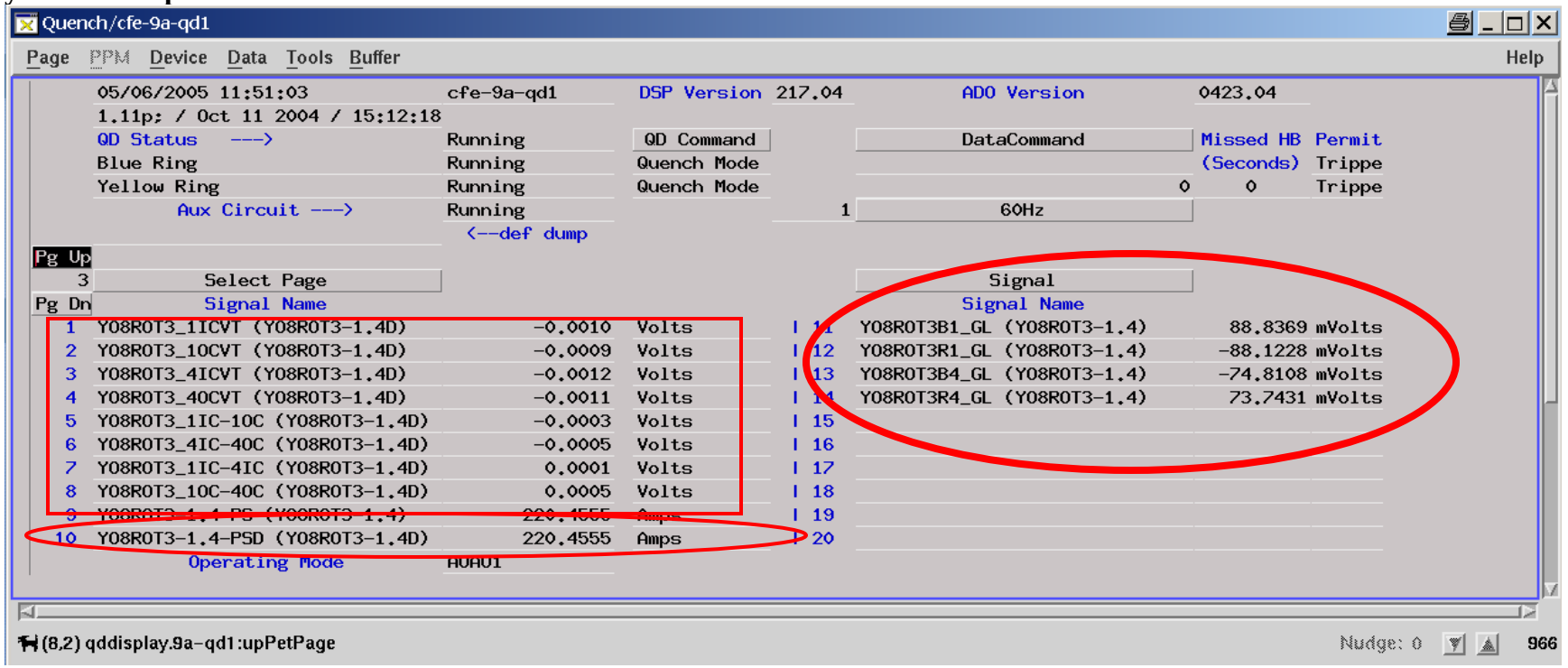
Bi8-rot3-1.4-ps



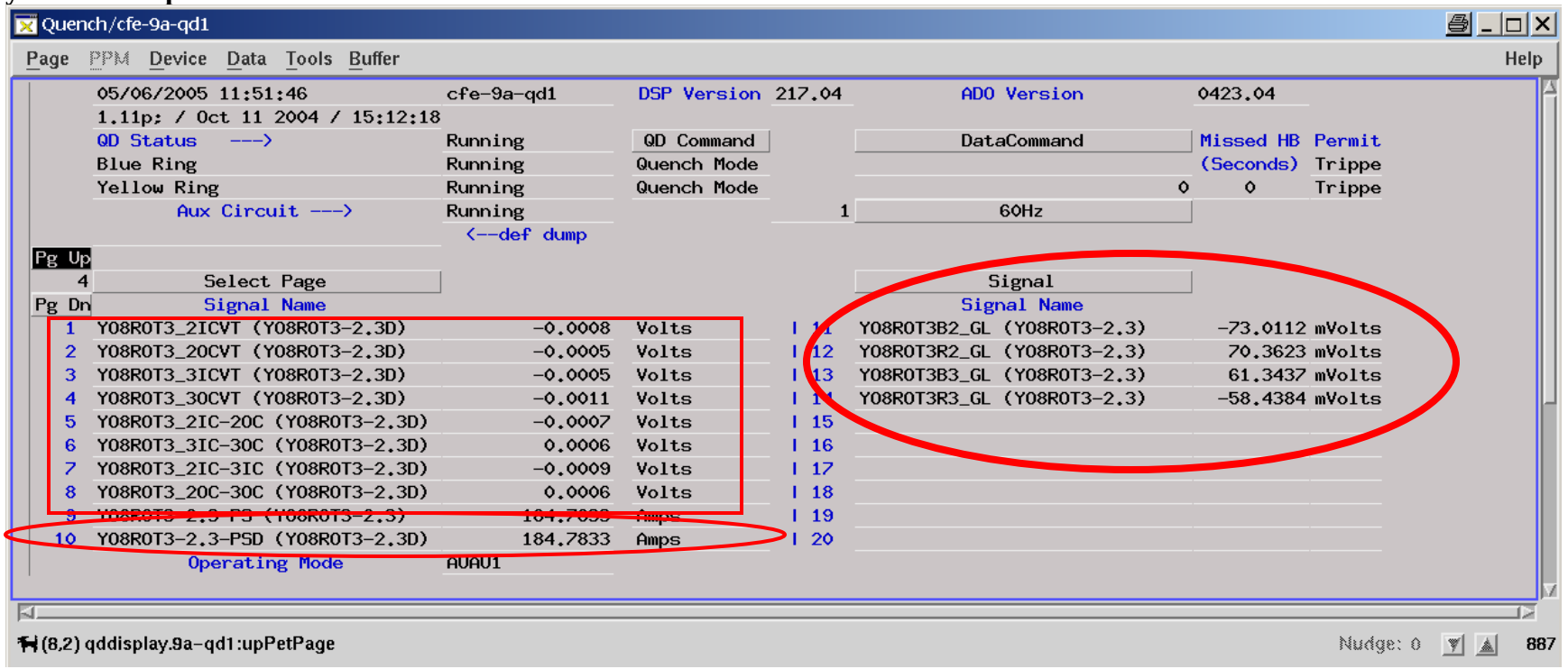
bi8-rot3-2.3-ps



yo8-rot3-1.4-ps

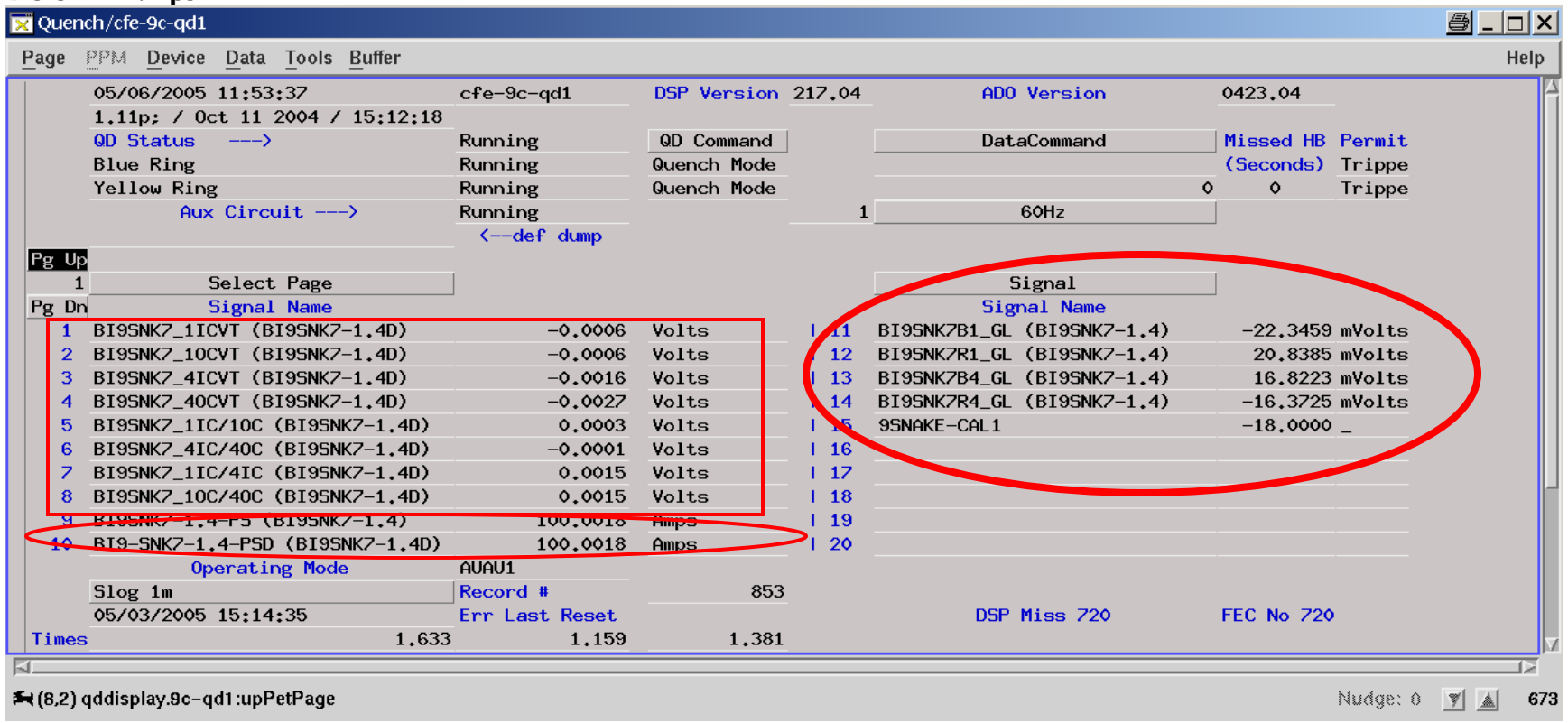


yo8-rot3-2.3-ps

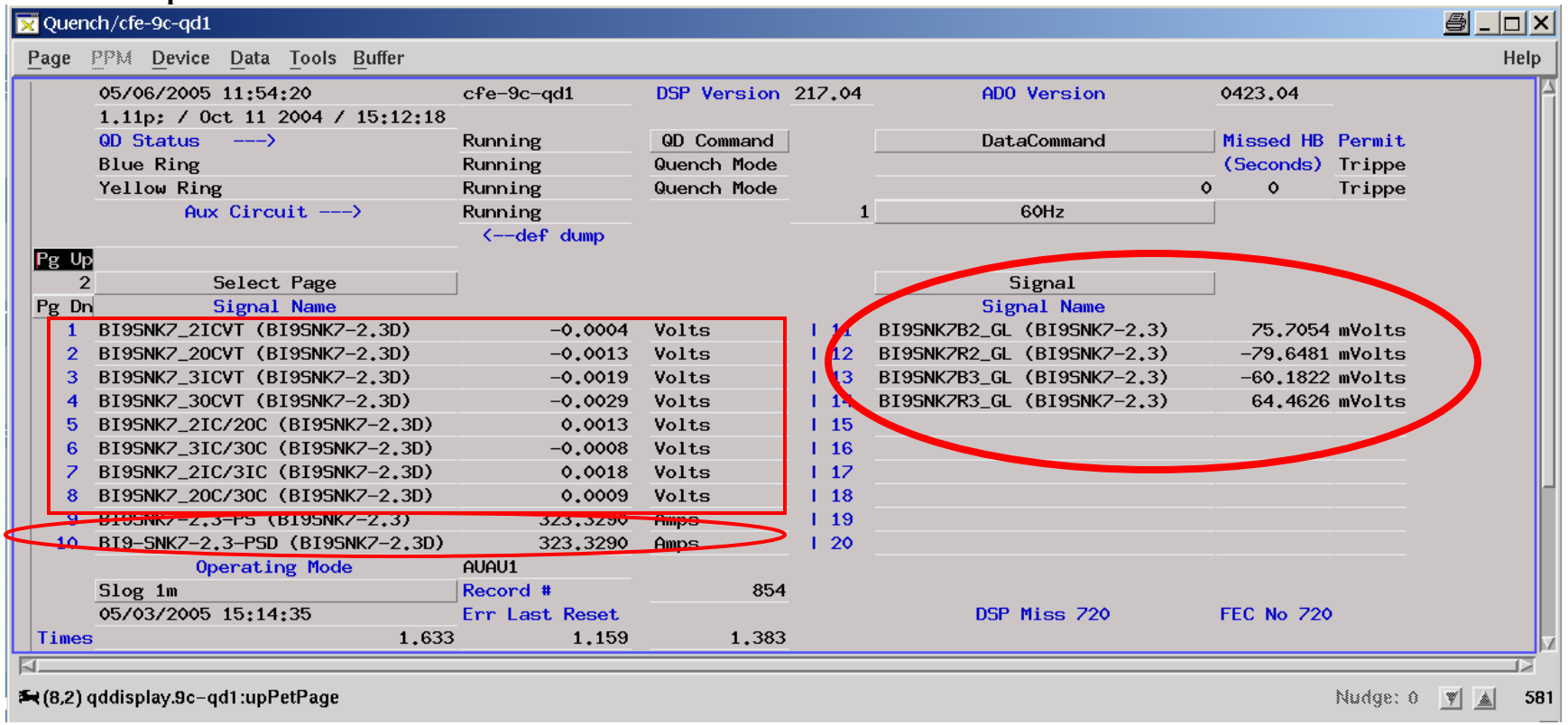


ALCOVE 9C-SNAKES

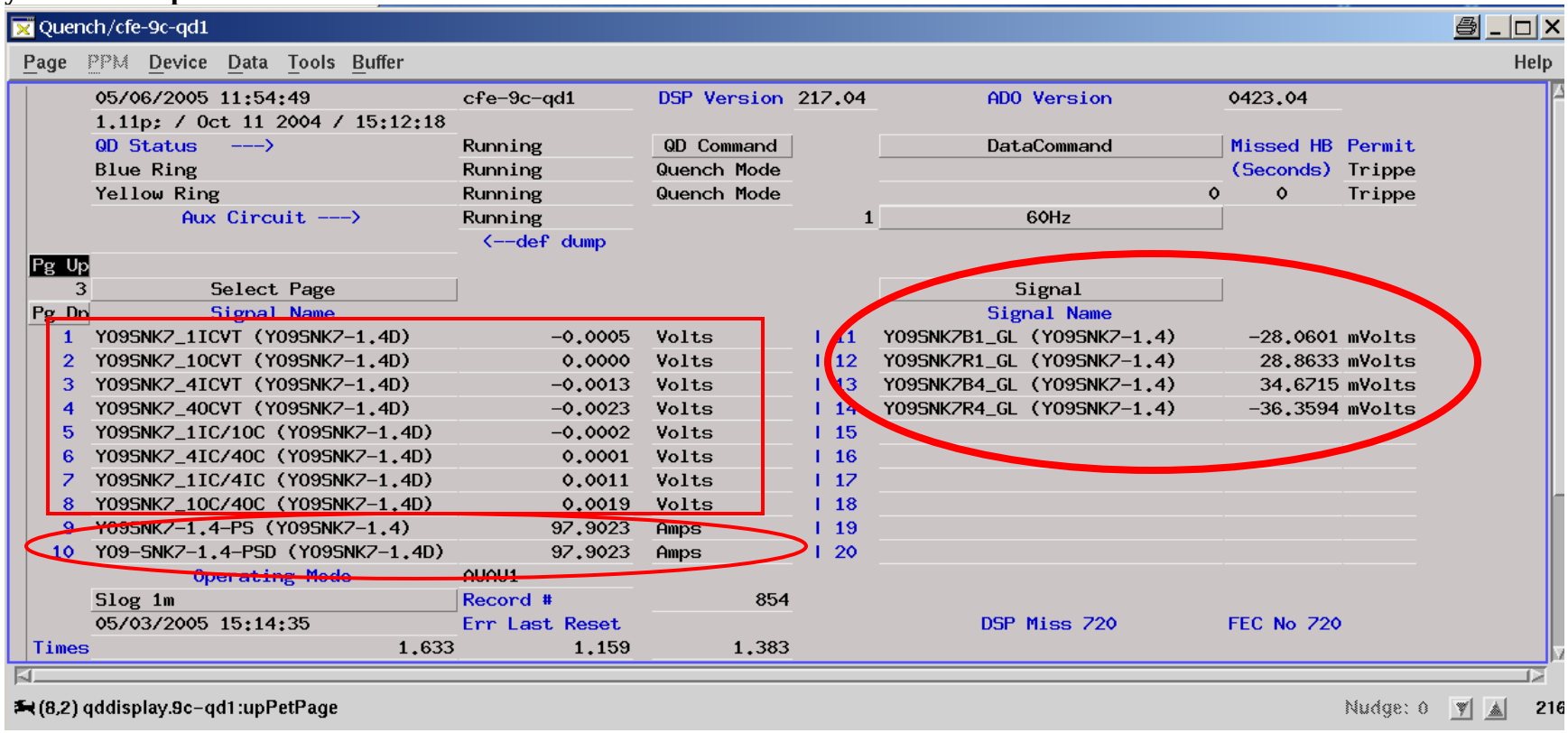
Bi9-snk7-1.4-ps



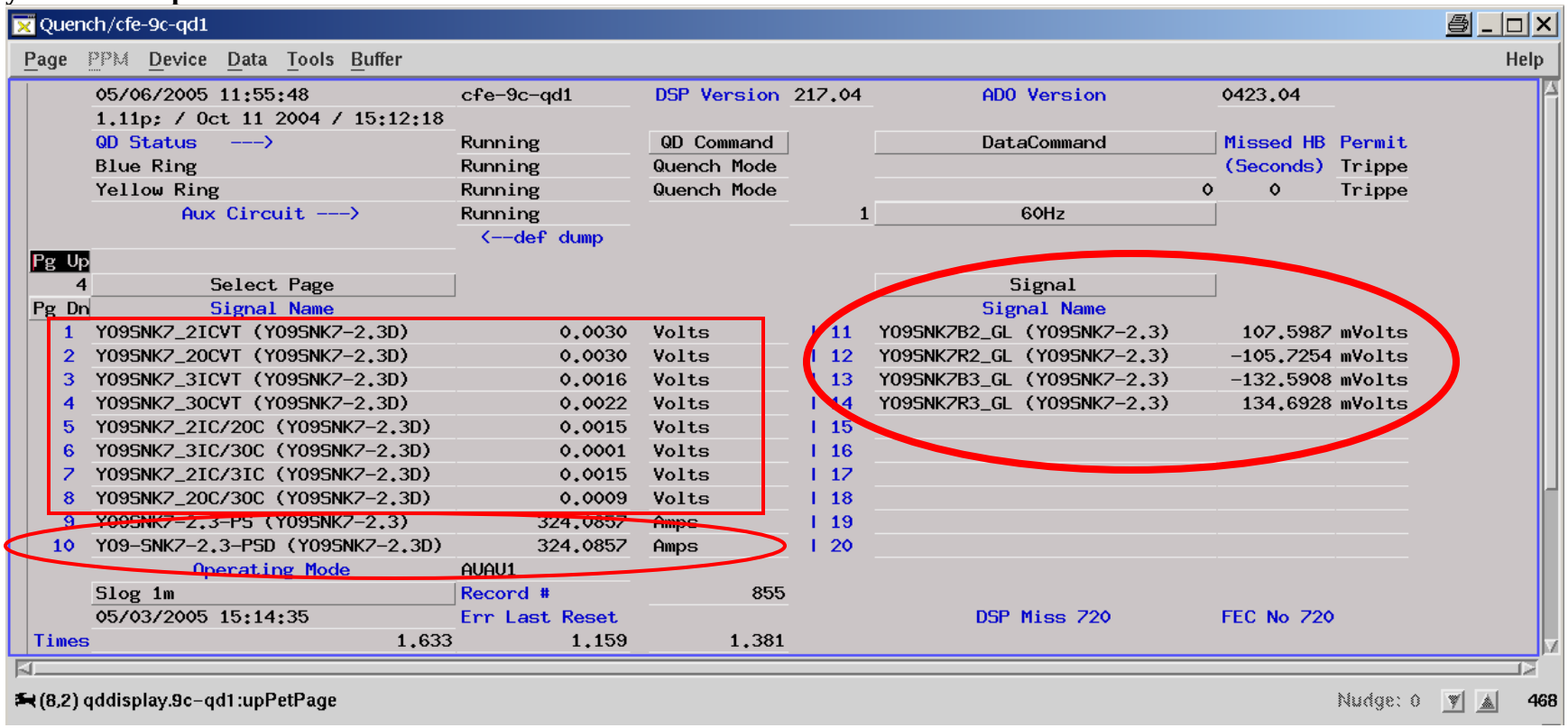
bi9-snk7-2.3-ps



yo9-snk7-1.4-ps



yo9-snk7-2.3-ps



Procedure for using Slow Logs to check Snake and Rotator Coil Voltage Taps and Gas cooled Leads

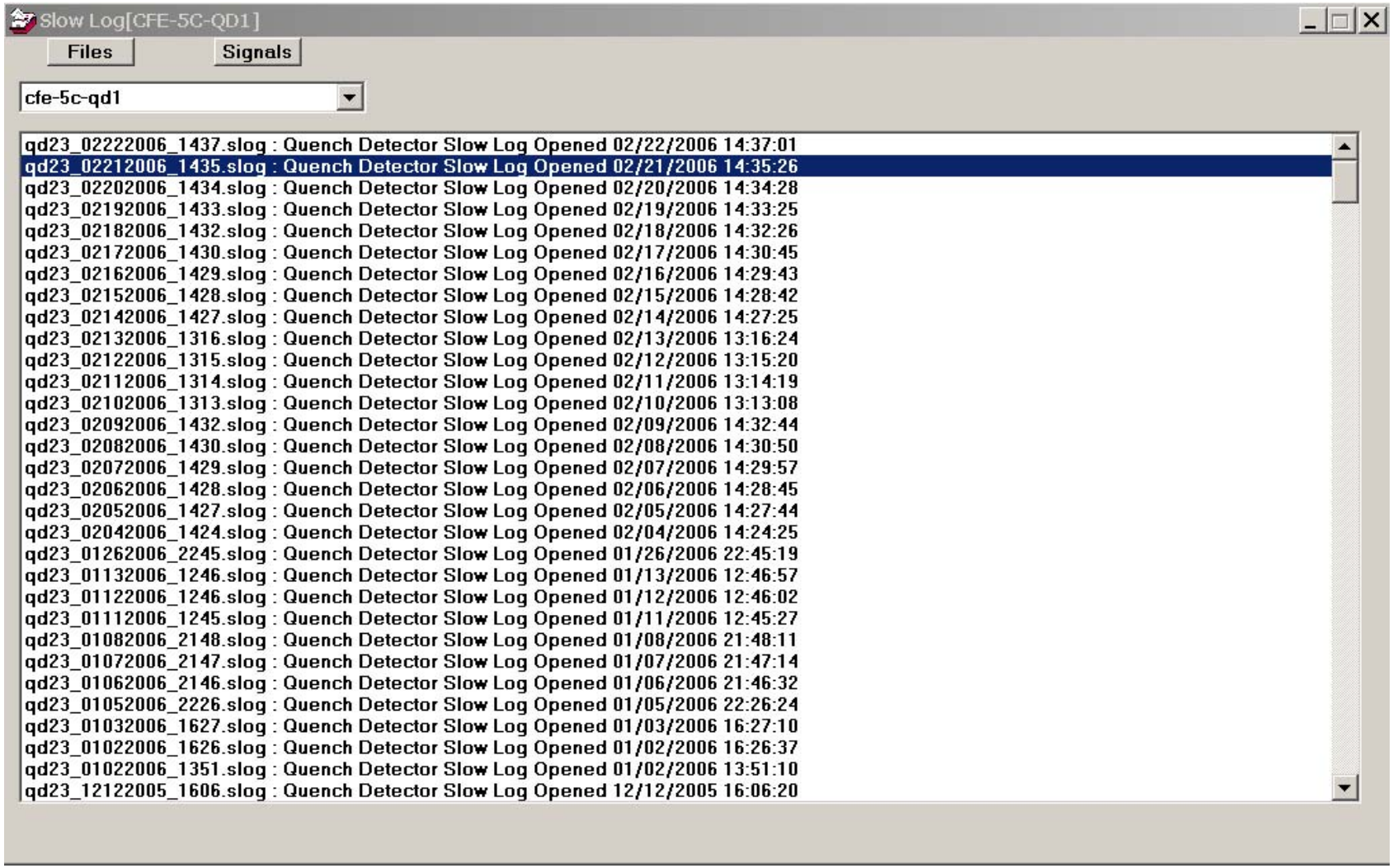
Procedure starts on page: 36

Slow Log Example Pages

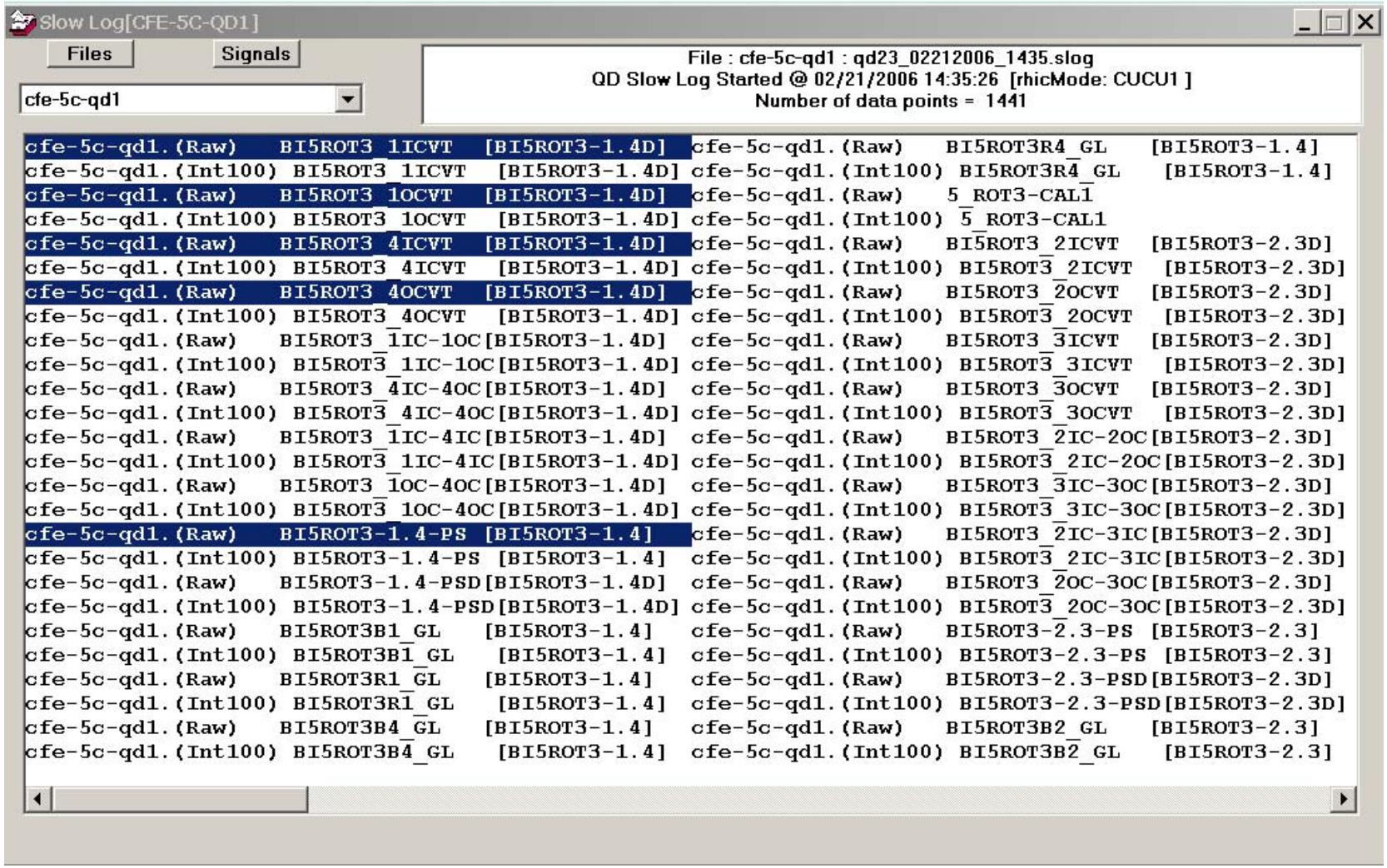
Gas Cooled Lead Examples

Procedure for Coil Voltage Tap Checkout using the quench detection slow logs

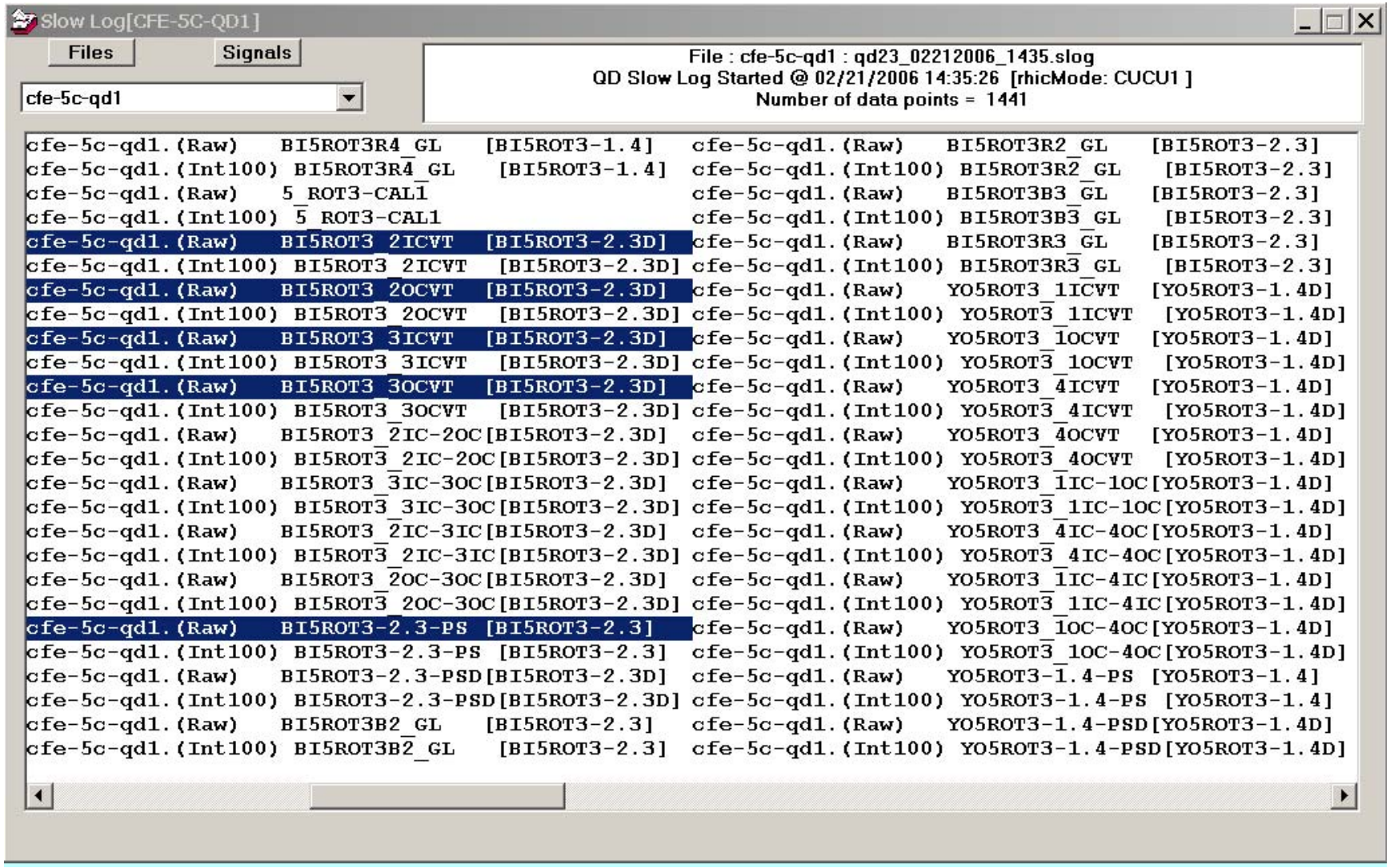
1) Bring up qdplot
2) Select a system (quench detector)
3) Click on SLOW LOG. You must pick a slow log, for the p.s. you are interested in, where only that ps is being ramped. For example if you are looking at a 1.4 then the 2.3 cannot be ramping. If you are looking at a 2.3 then the 1.4 cannot be ramping. Only one of the pair of p.s.'s can be ramping at a time to do this check.
4) Do not select the most recent slow log (top most) select the 2nd one down, this is the next most recent. See figure below with blue highlight, this is the one to choose.



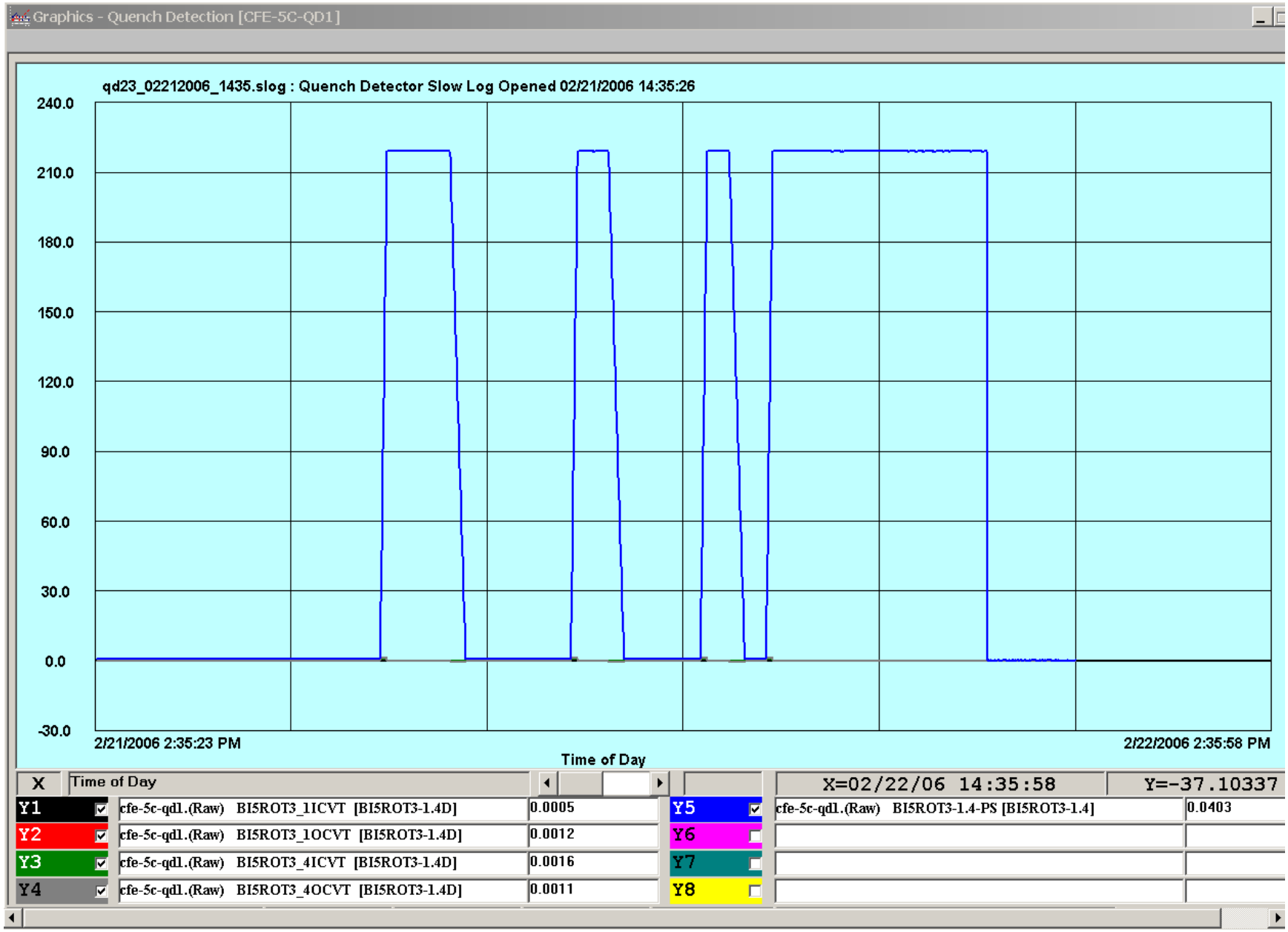
5) Select the 4 raw voltage tap signals to look at and the raw p.s. current. Using bi5-rot3-1.4 as an example these are the ones you would choose:



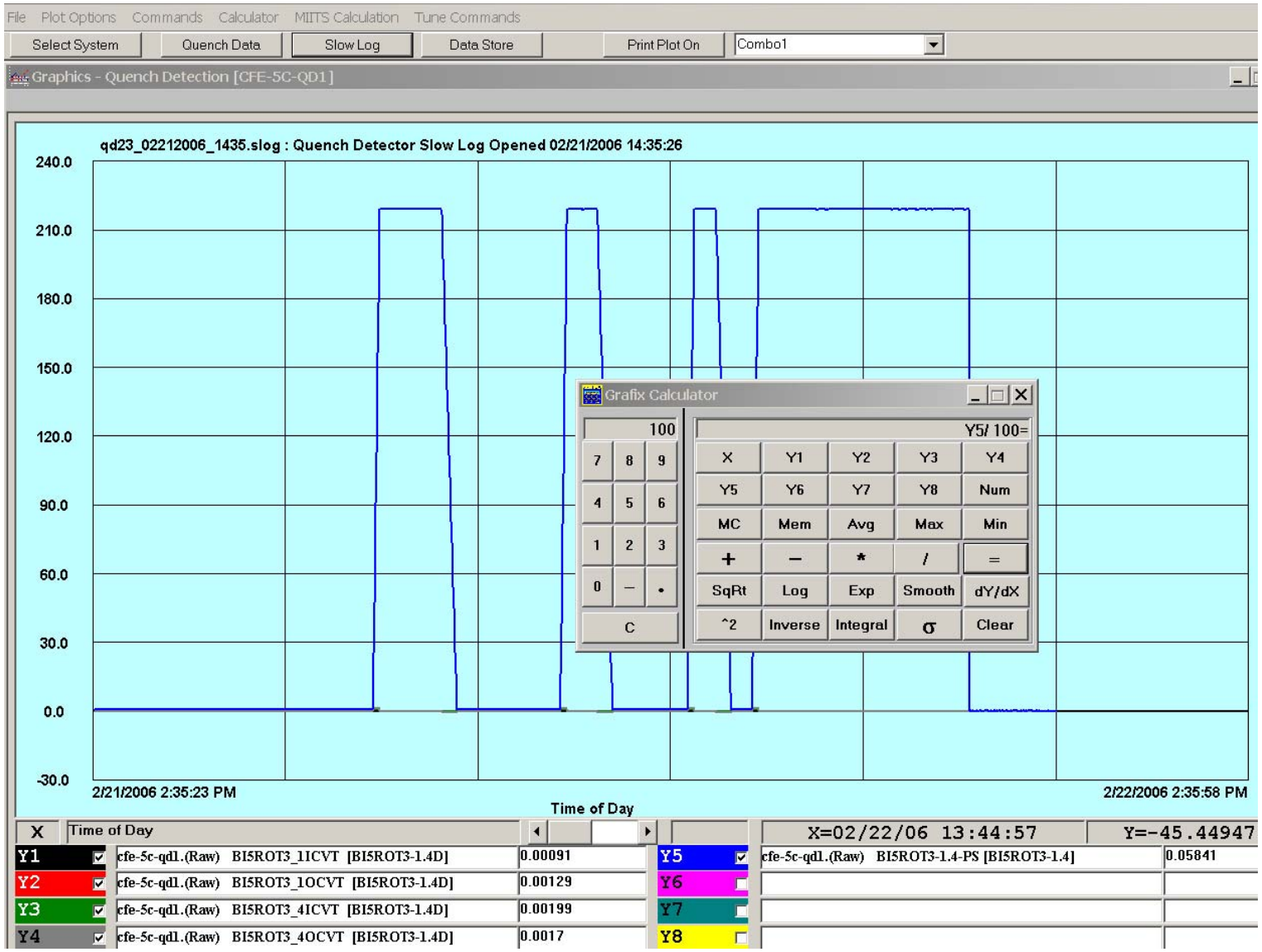
6) If you are working with bi5-rot3-2.3 then you would choose the following 4 raw voltage taps and raw p.s. current below. Use this procedure for all 1.4 and 2.3 p.s.'s, blue or yellow:



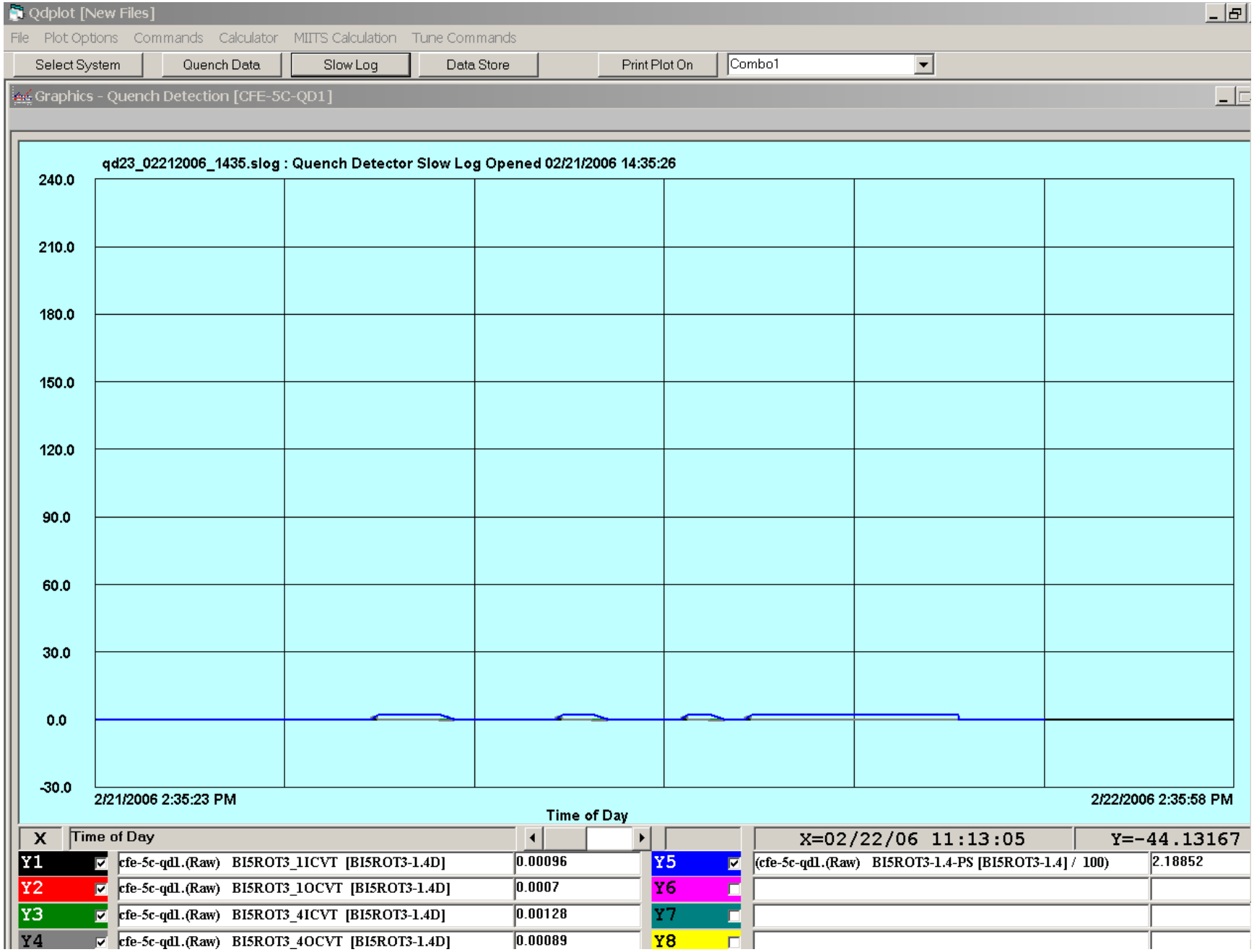
7) Now that you have the signals on qd plot you should make sure the raw current signal is in the space for Y5 as shown below. Click on qdplot to look at the waveforms. Y5 (blue), the current signal, should be much bigger than the voltage tap signals, see below. You will need to scale the current signal with the calculator.



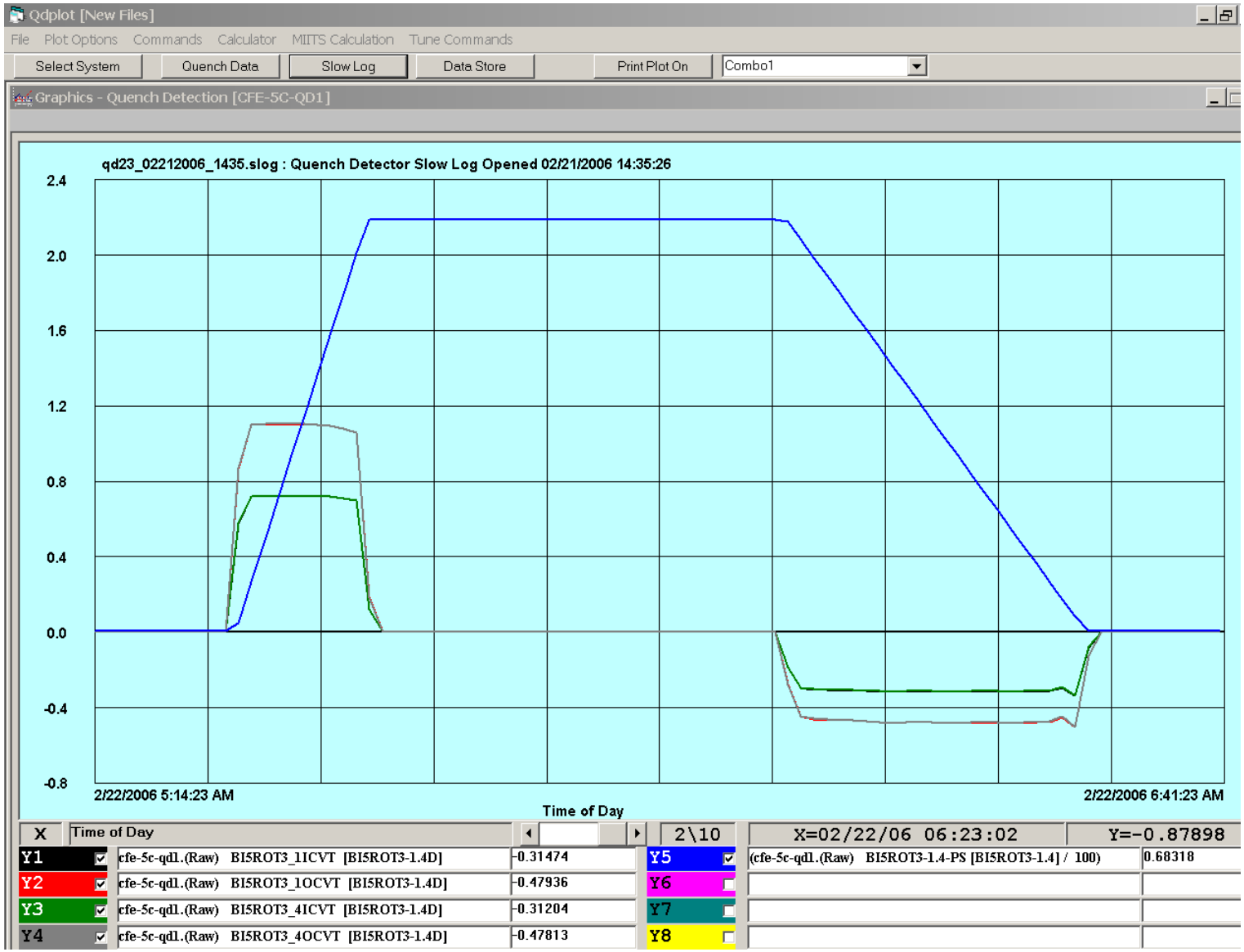
8) Click on “Calculator” on the top menu. Enter 100 on the left hand side of the calculator using the buttons on the calculator. Then, on the right hand side of the calculator click on “Y5/NUM=” as is shown below. Then click on “Y5”. The calculator screen on the right hand side will go blank but the 100 will stay on the calculator screen on the right hand side. Also, Y5 will now be scaled down by 100 times on the qdplot. See what Y5 says now on the next page.



9) Click on the qd plot You see below the blue waveform got a lot smaller and Y5 is now shown as divided by 100.



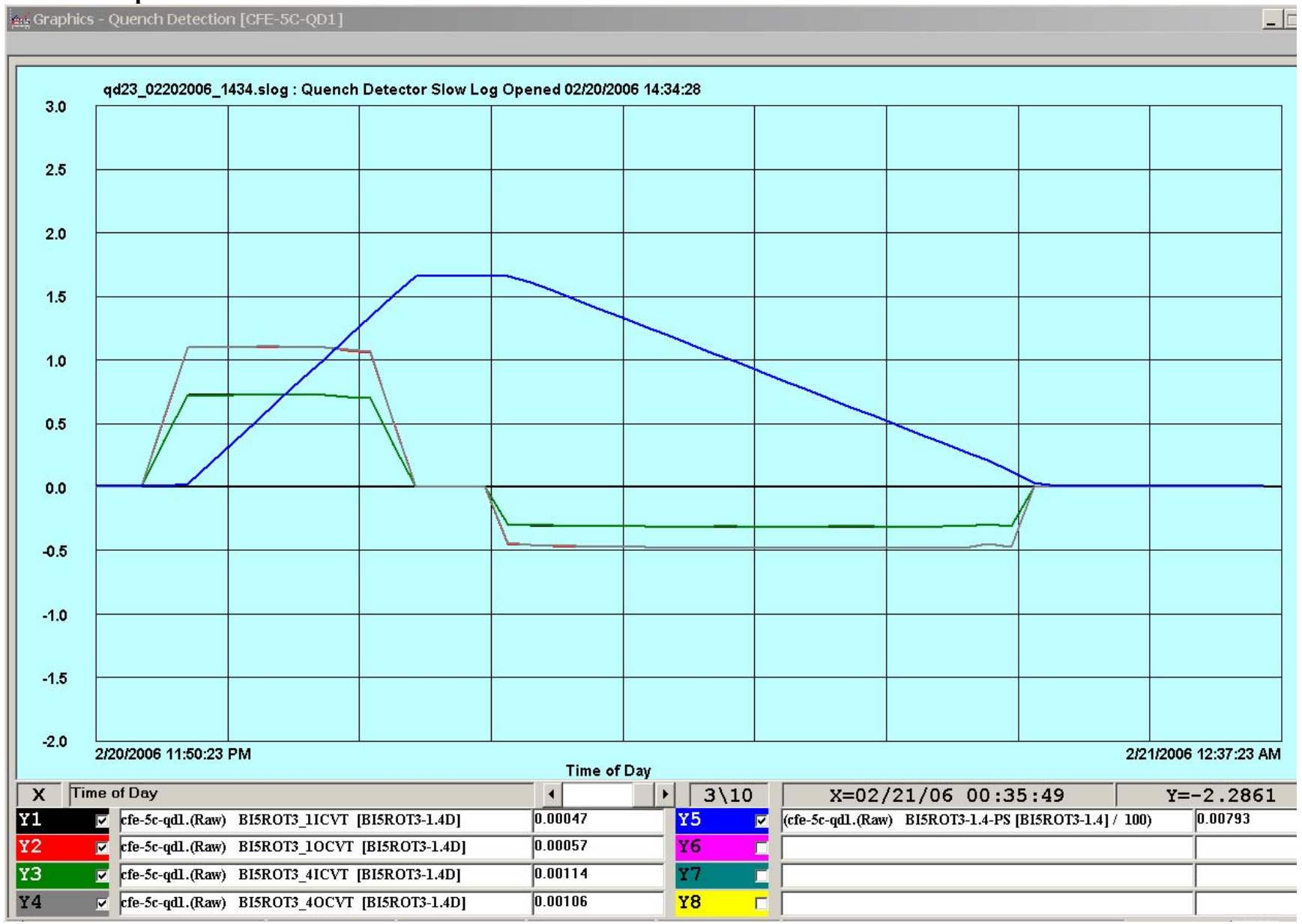
10) You should now pick one of these ramps and zoom in on it as shown below. Here you see the 2 inner coils are equal. The 2 outer coils are equal. You also see that when the ps current is ramping up you do have a change in current (di/dt ≠ 0) so you have positive voltage on the coils. You also see that when the ps current is ramping down you do have a change in current (di/dt ≠ 0) so you have negative voltage on the coils. When the current is not changing (di/dt=0) the voltage on all coils =0.



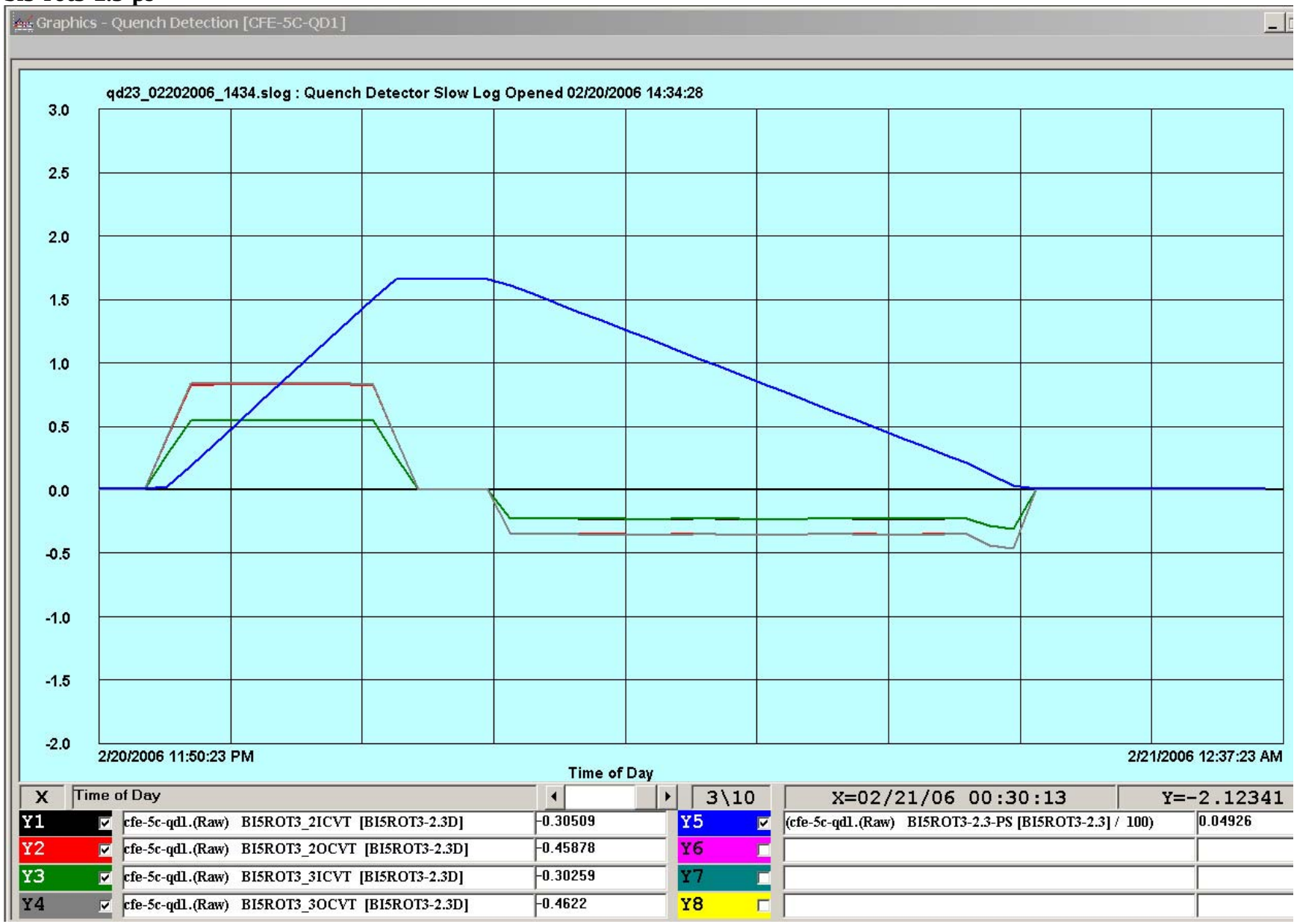
11) What follows are plots for all of the snakes and rotators so you can compare coil voltages and ps current ramps.

Alcove 5C-Slow Logs

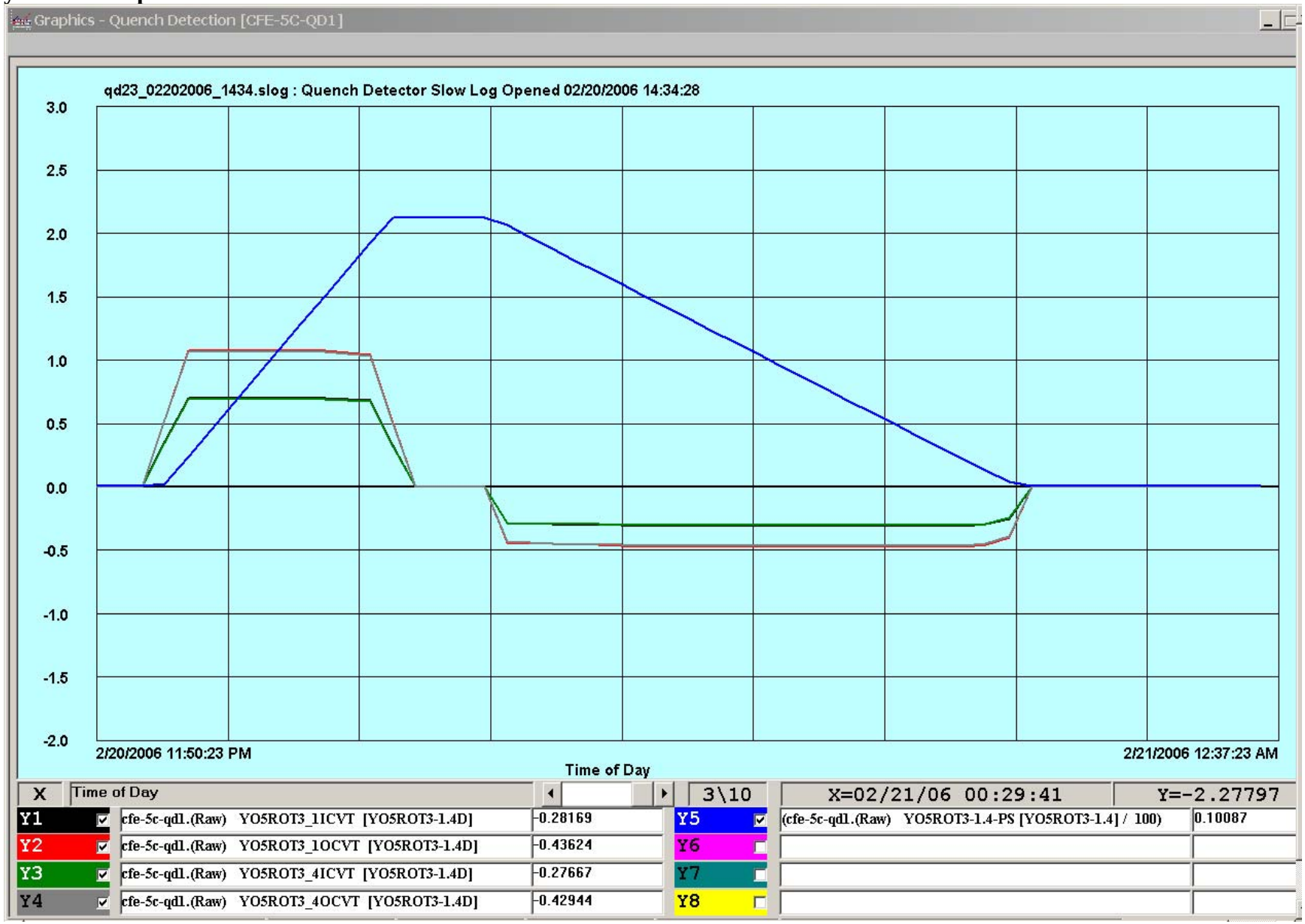
Bi5-rot3-1.4-ps



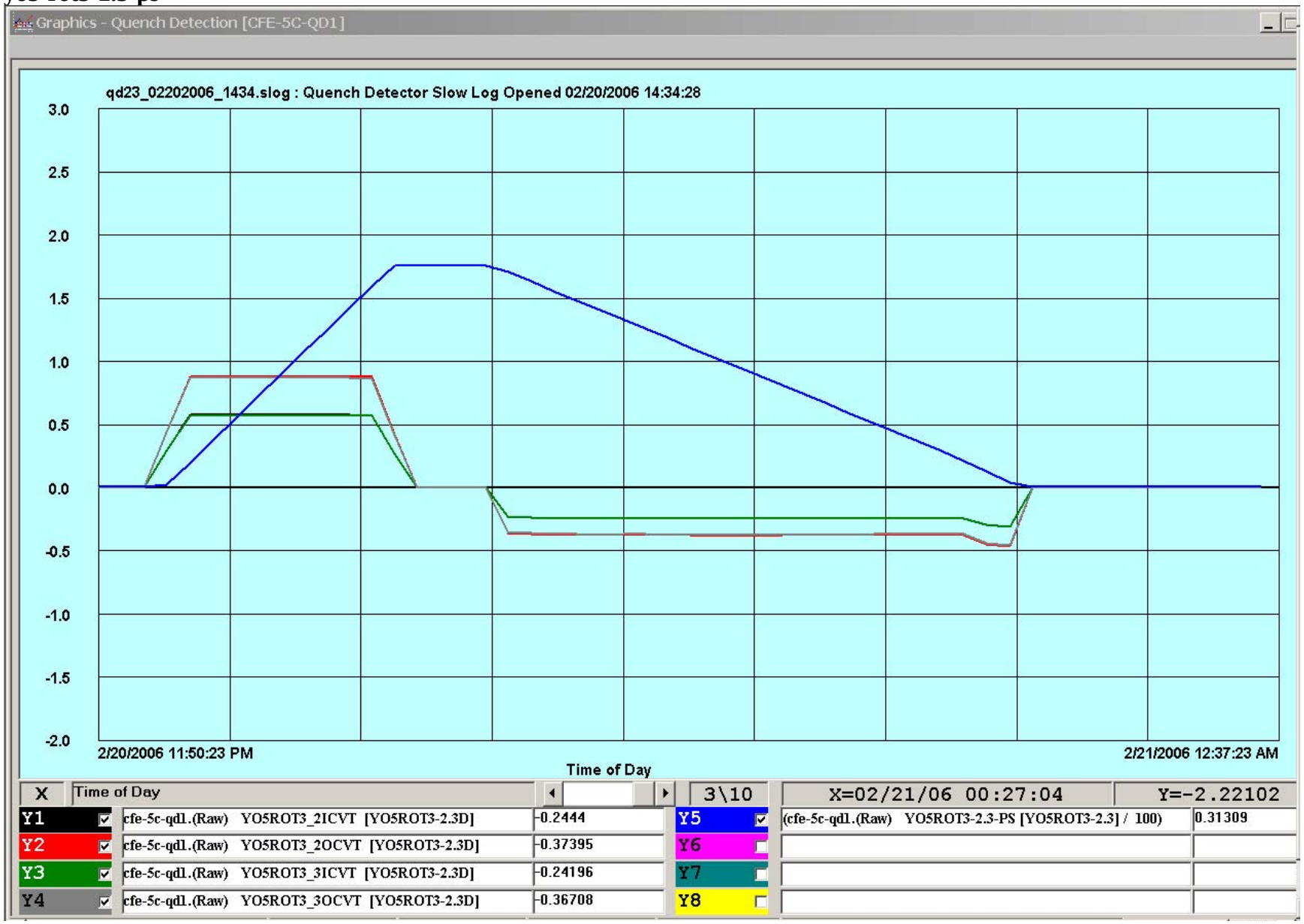
bi5-rot3-2.3-ps



yo5-rot3-1.4-ps

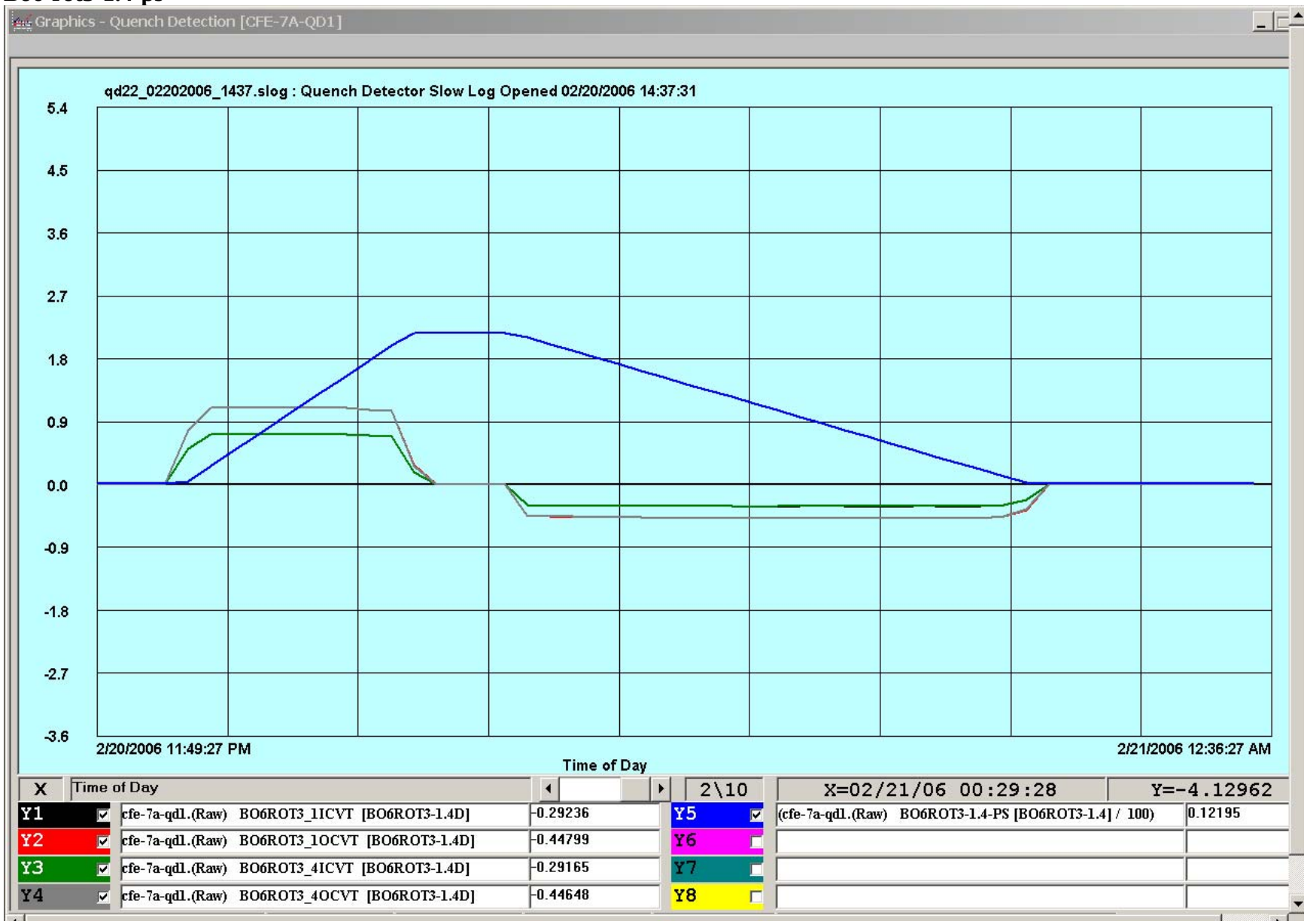


yo5-rot3-2.3-ps

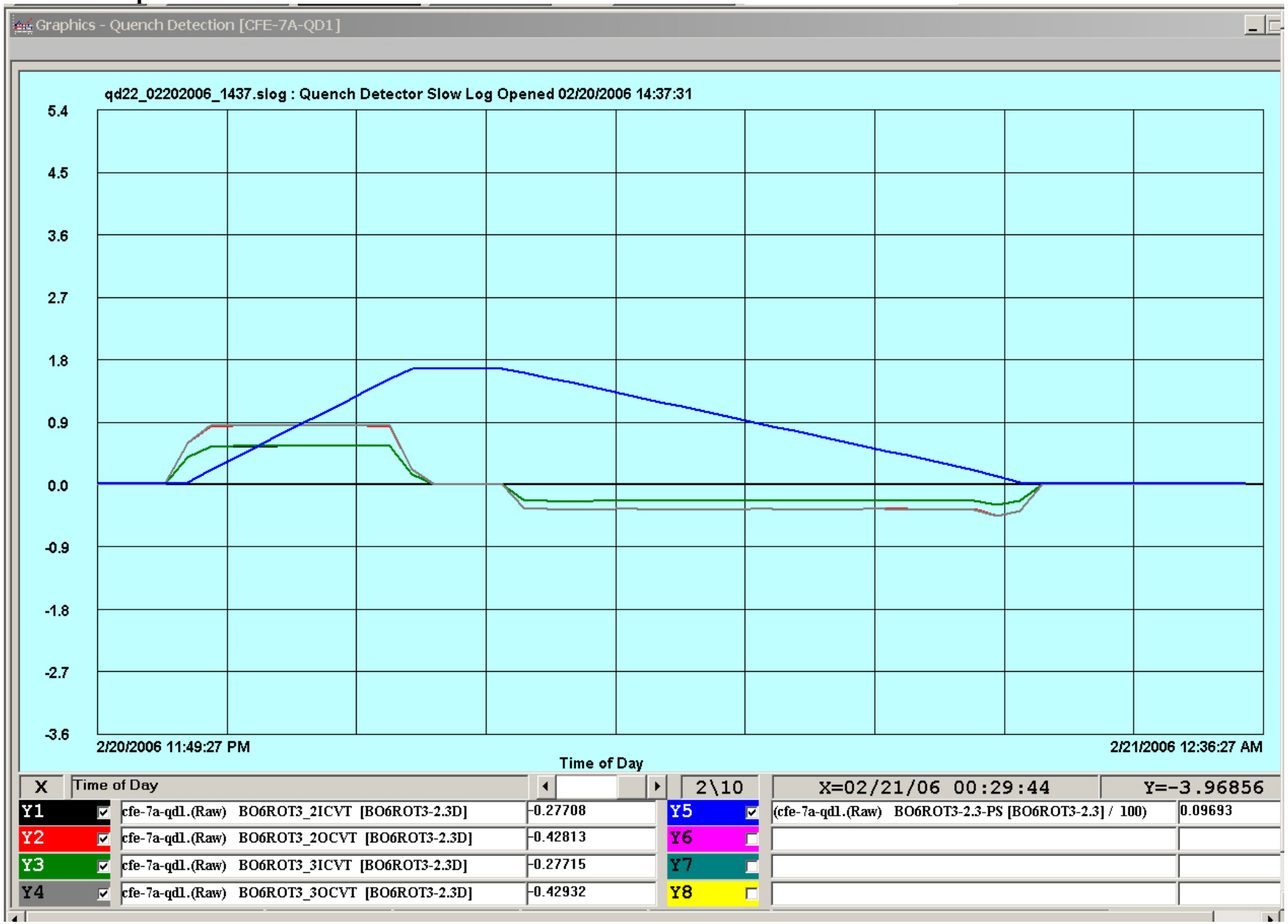


Alcove 7A-Slow Logs

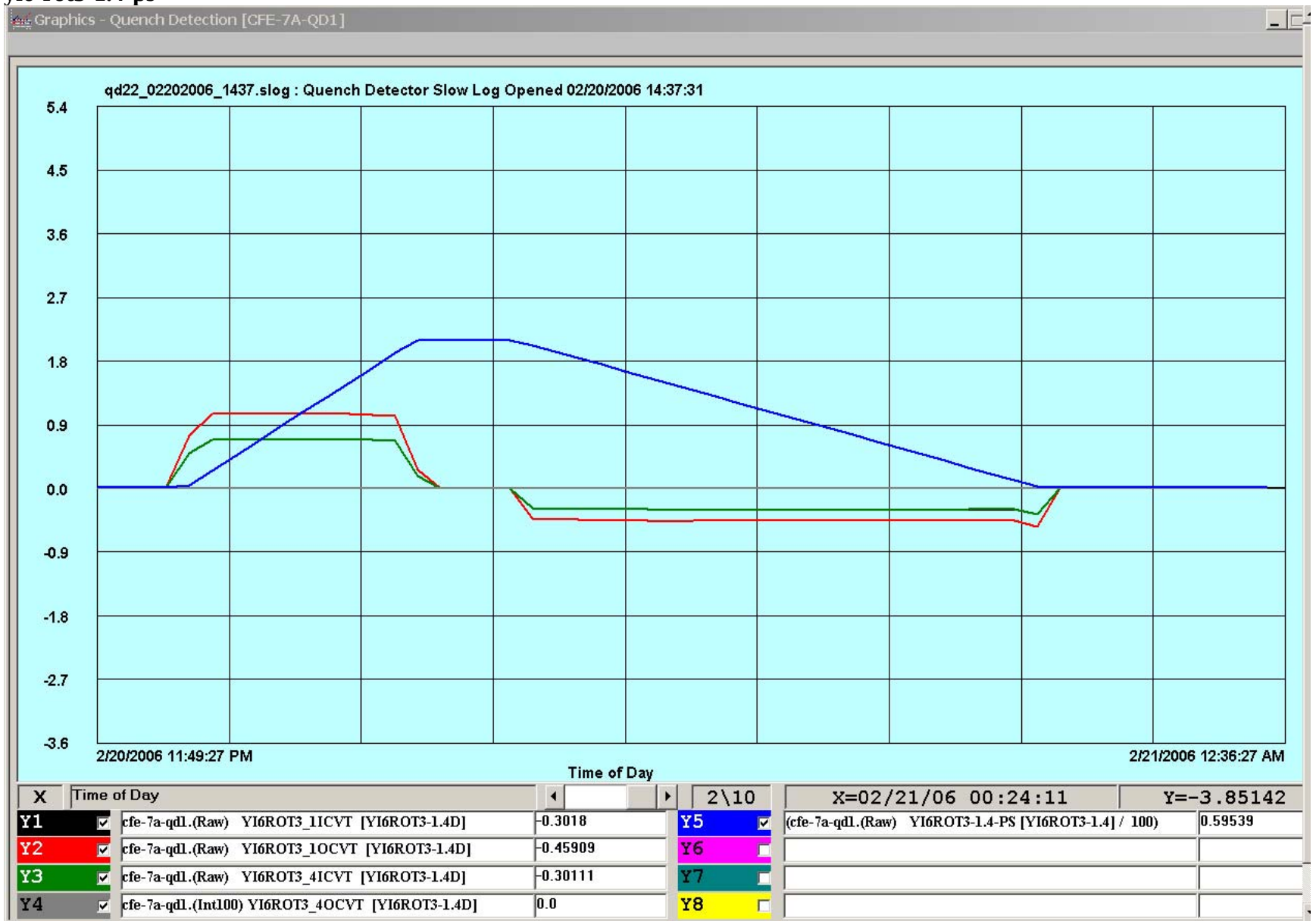
Bo6-rot3-1.4-ps



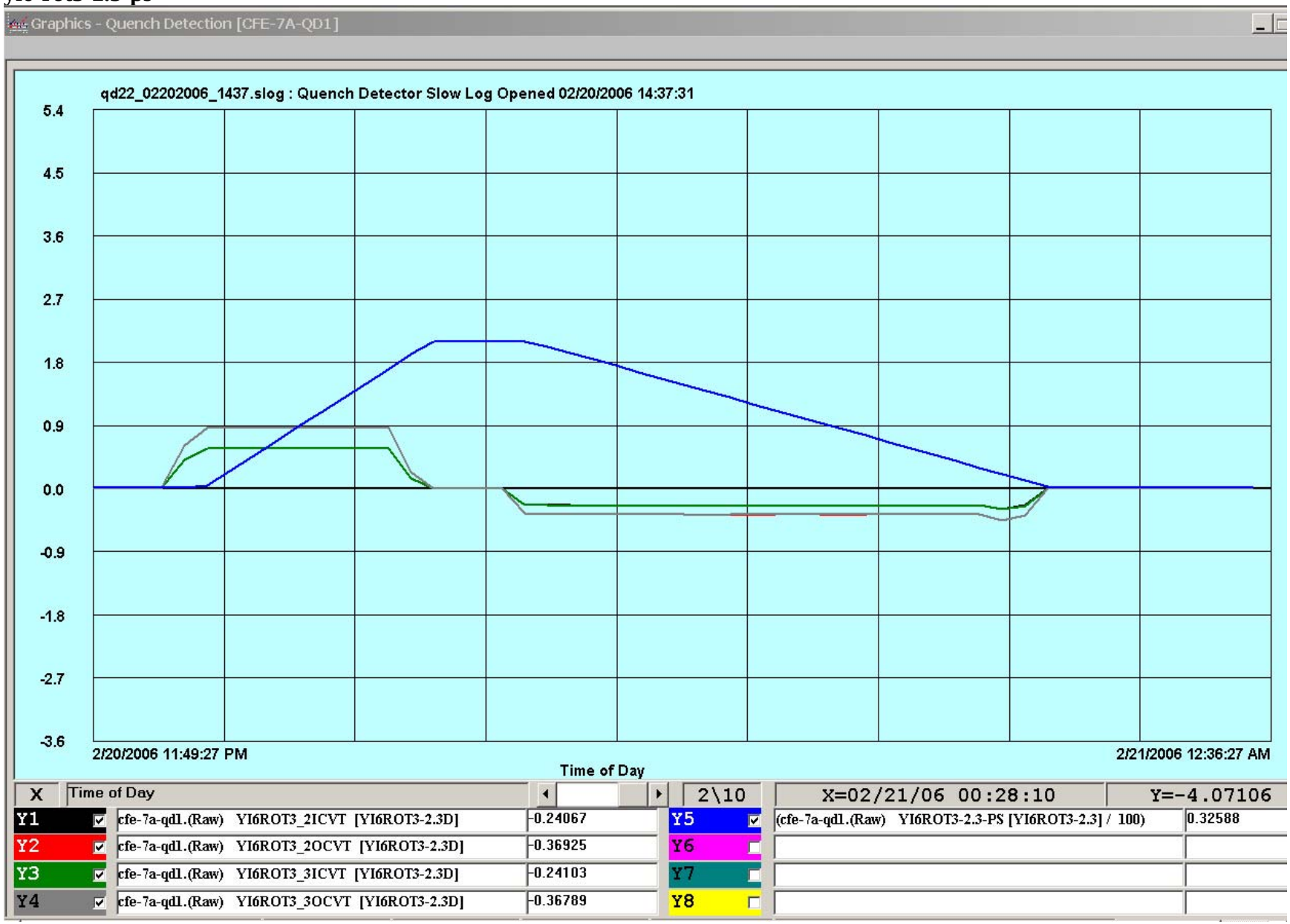
bo6-rot3-2.3-ps



yi6-rot3-1.4-ps

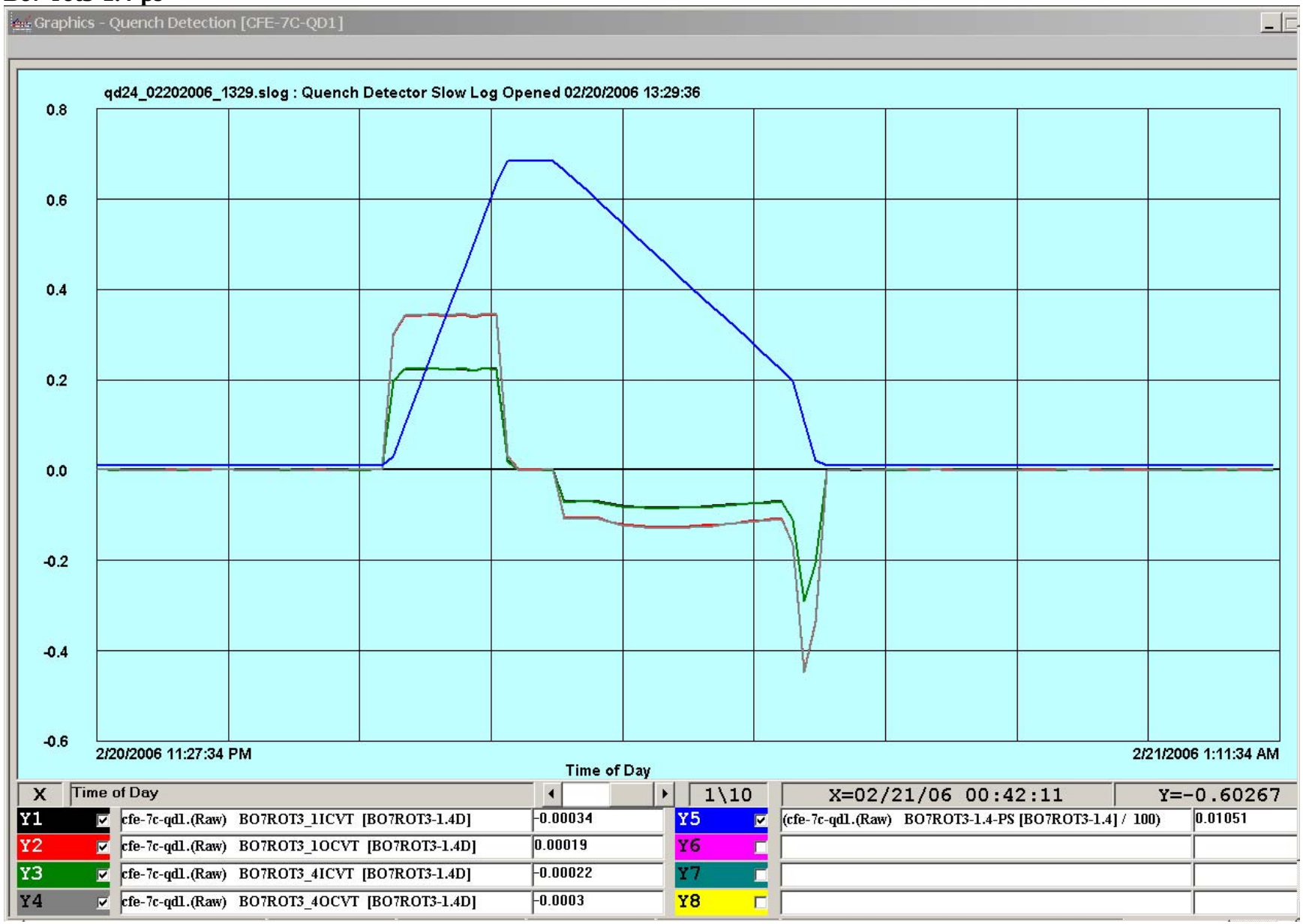


yi6-rot3-2.3-ps

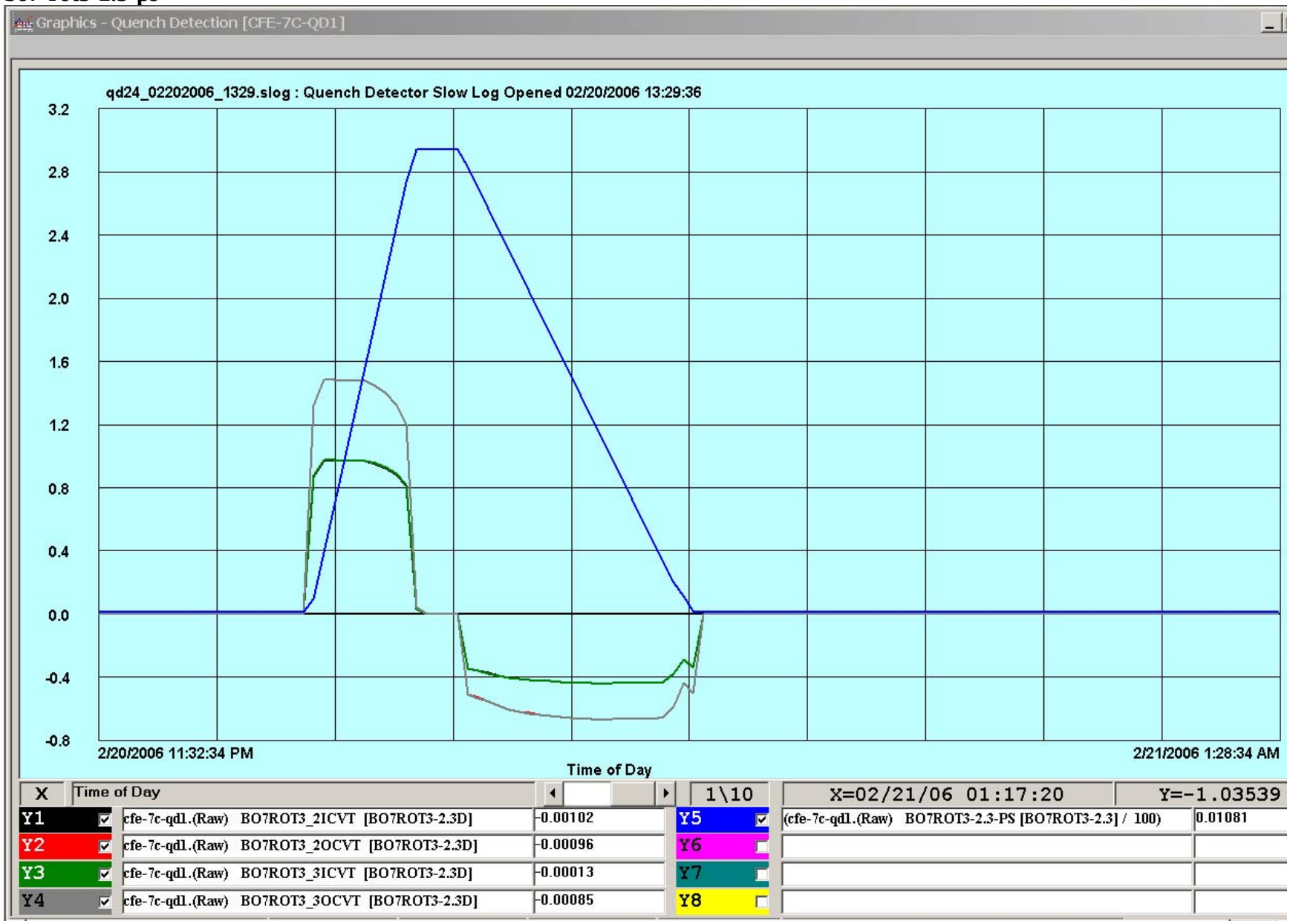


Alcove 7C-Slow Logs

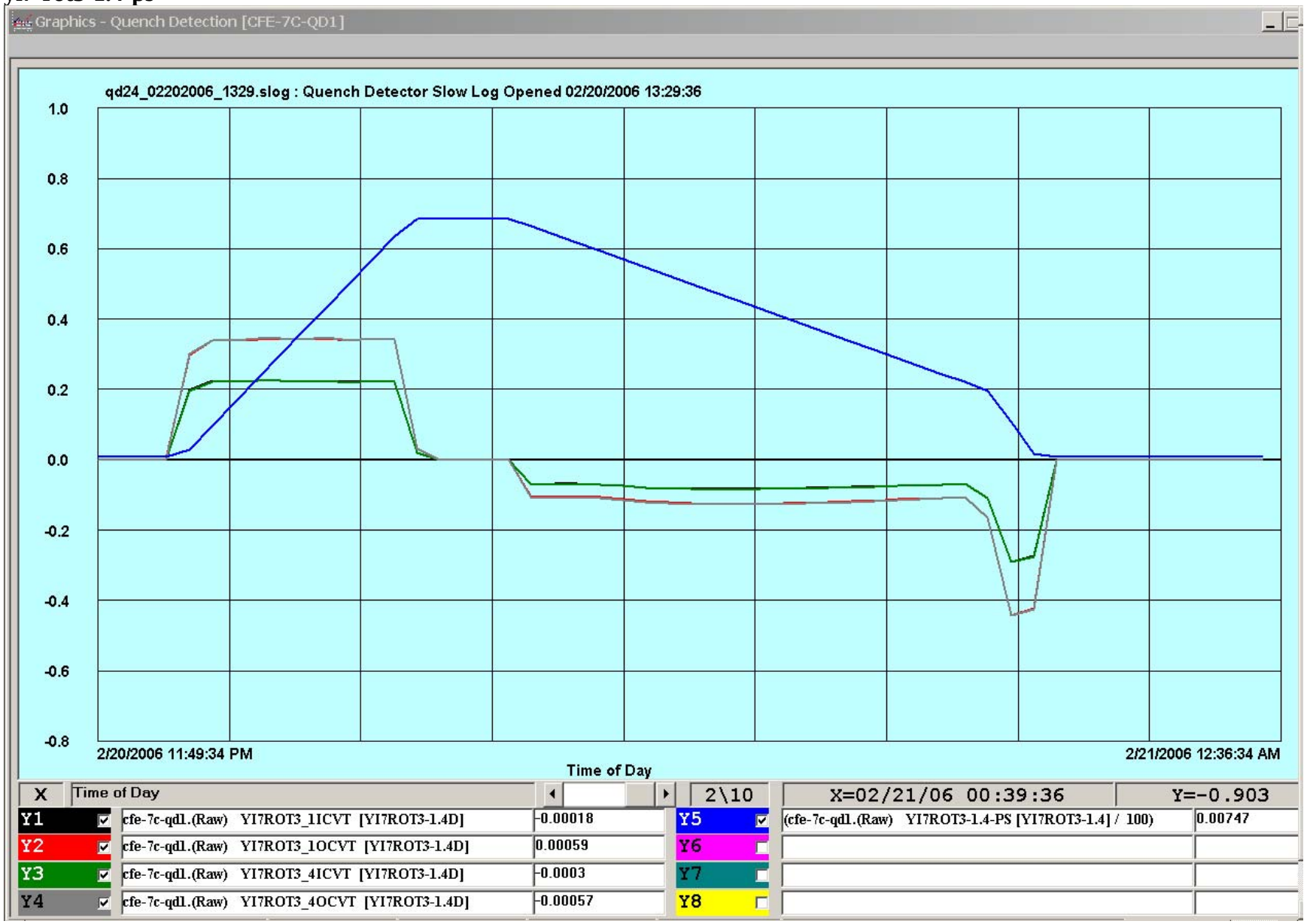
Bo7-rot3-1.4-ps



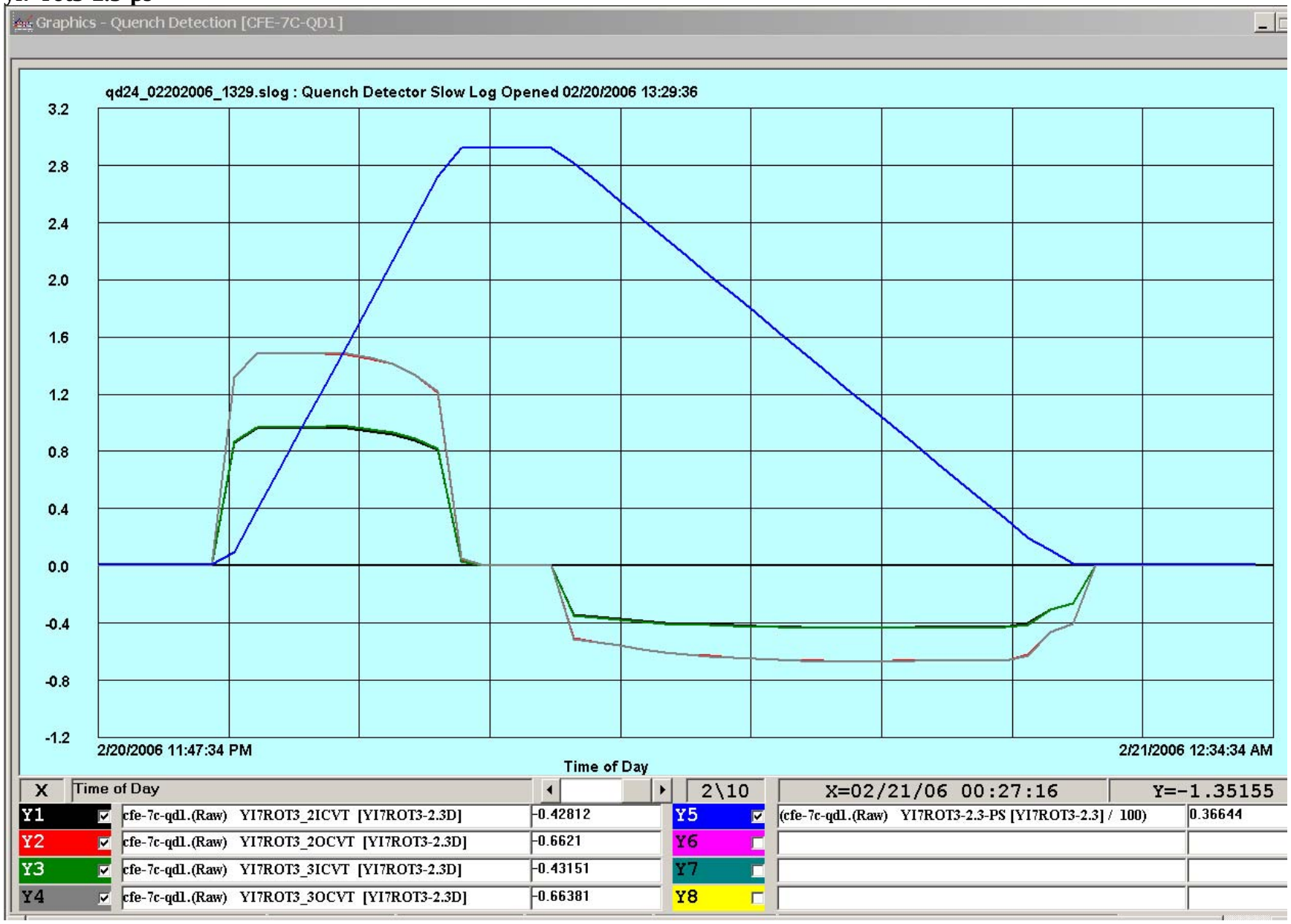
bo7-rot3-2.3-ps



yi7-rot3-1.4-ps

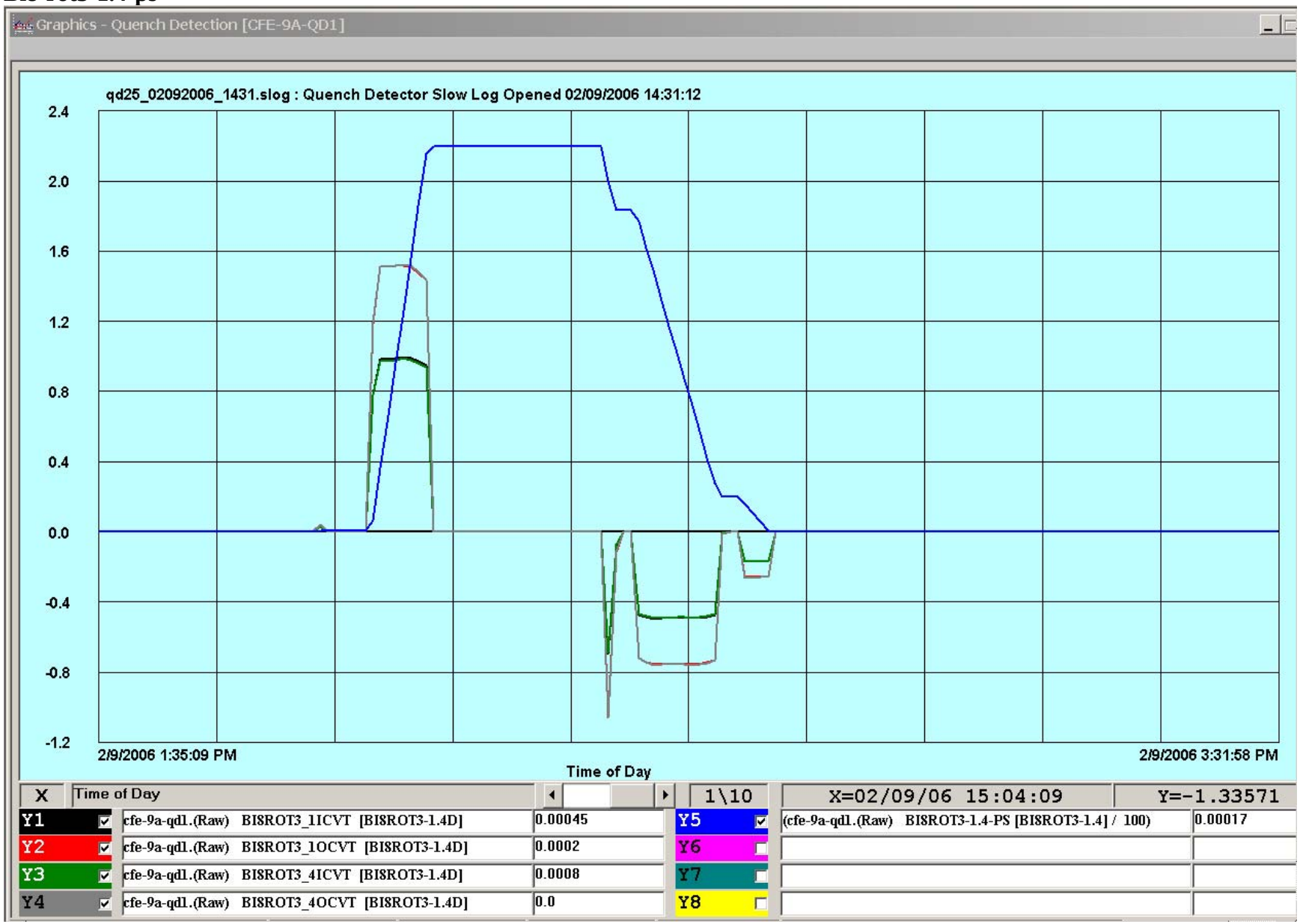


yi7-rot3-2.3-ps

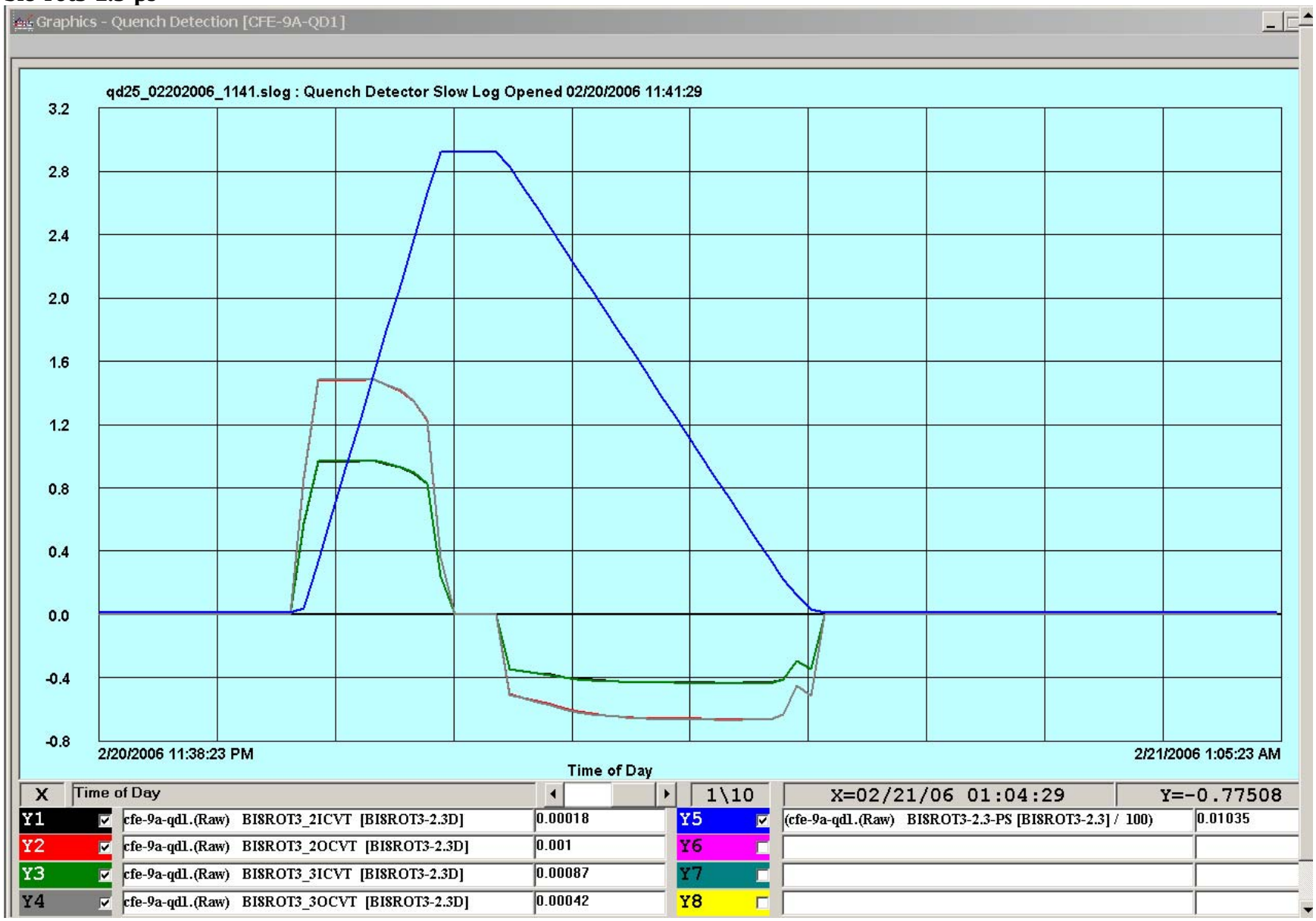


Alcove 9A-Slow Logs

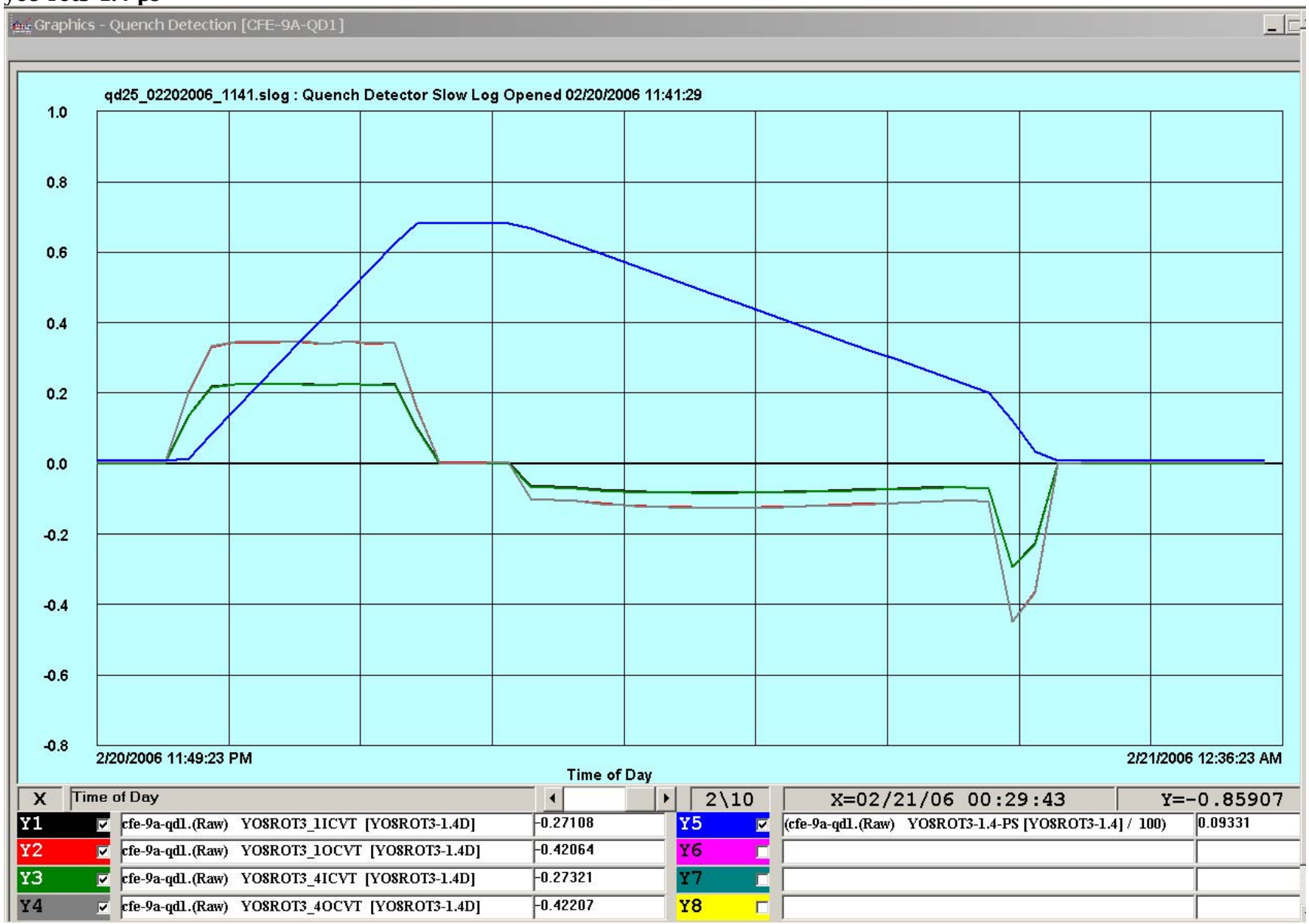
Bi8-rot3-1.4-ps



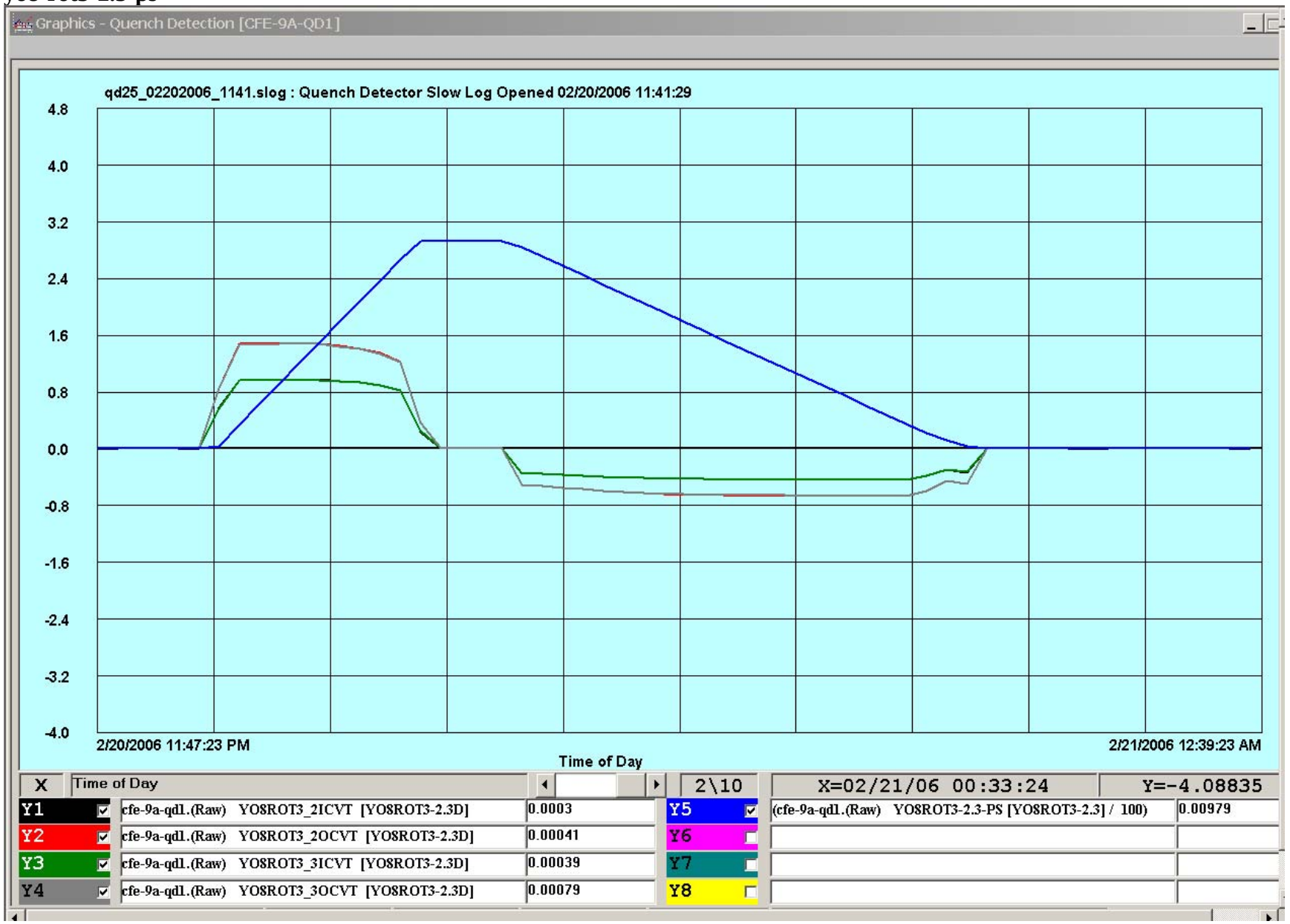
bi8-rot3-2.3-ps



yo8-rot3-1.4-ps

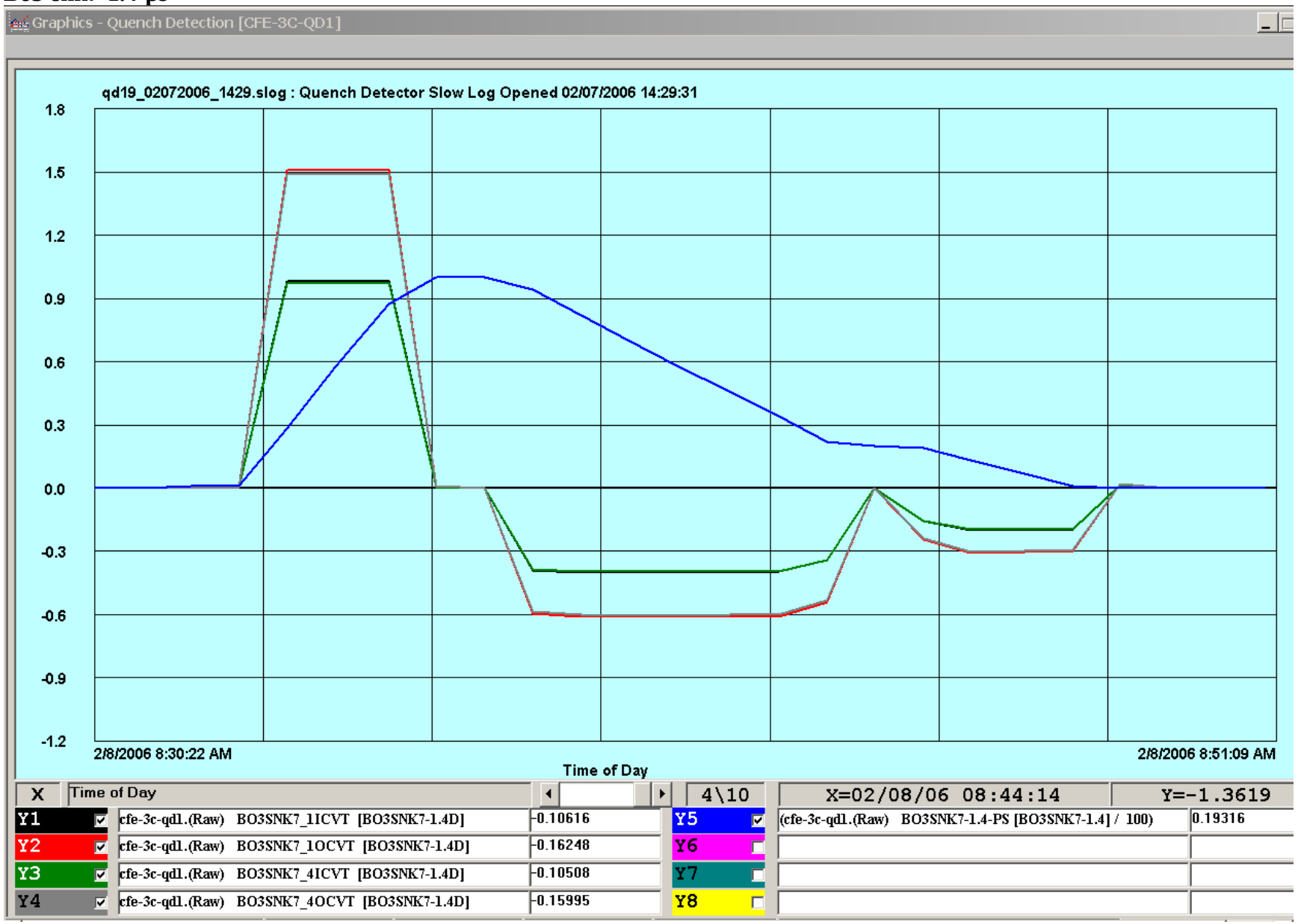


yo8-rot3-2.3-ps

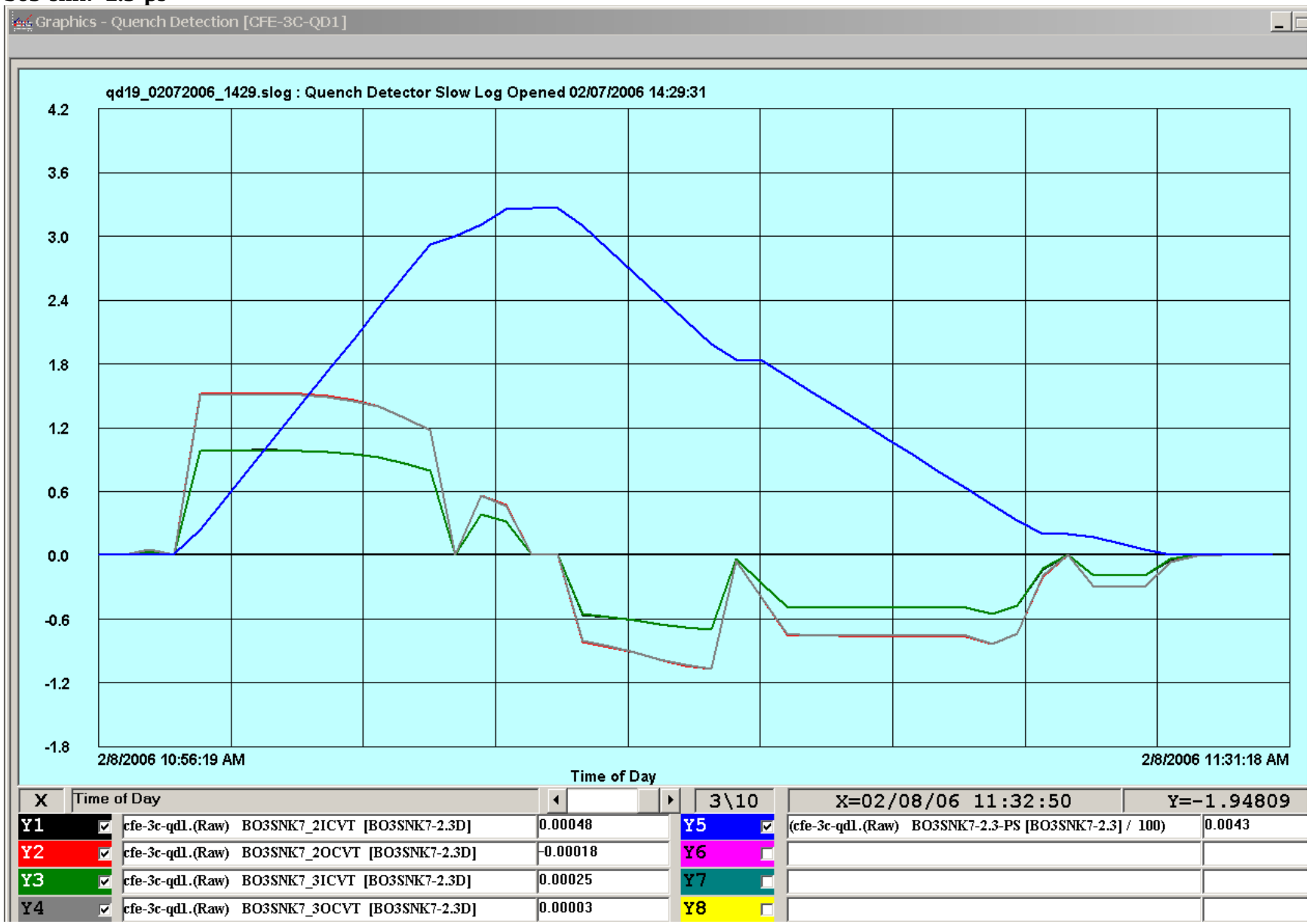


Alcove 3C-Slow Logs

Bo3-snk7-1.4-ps

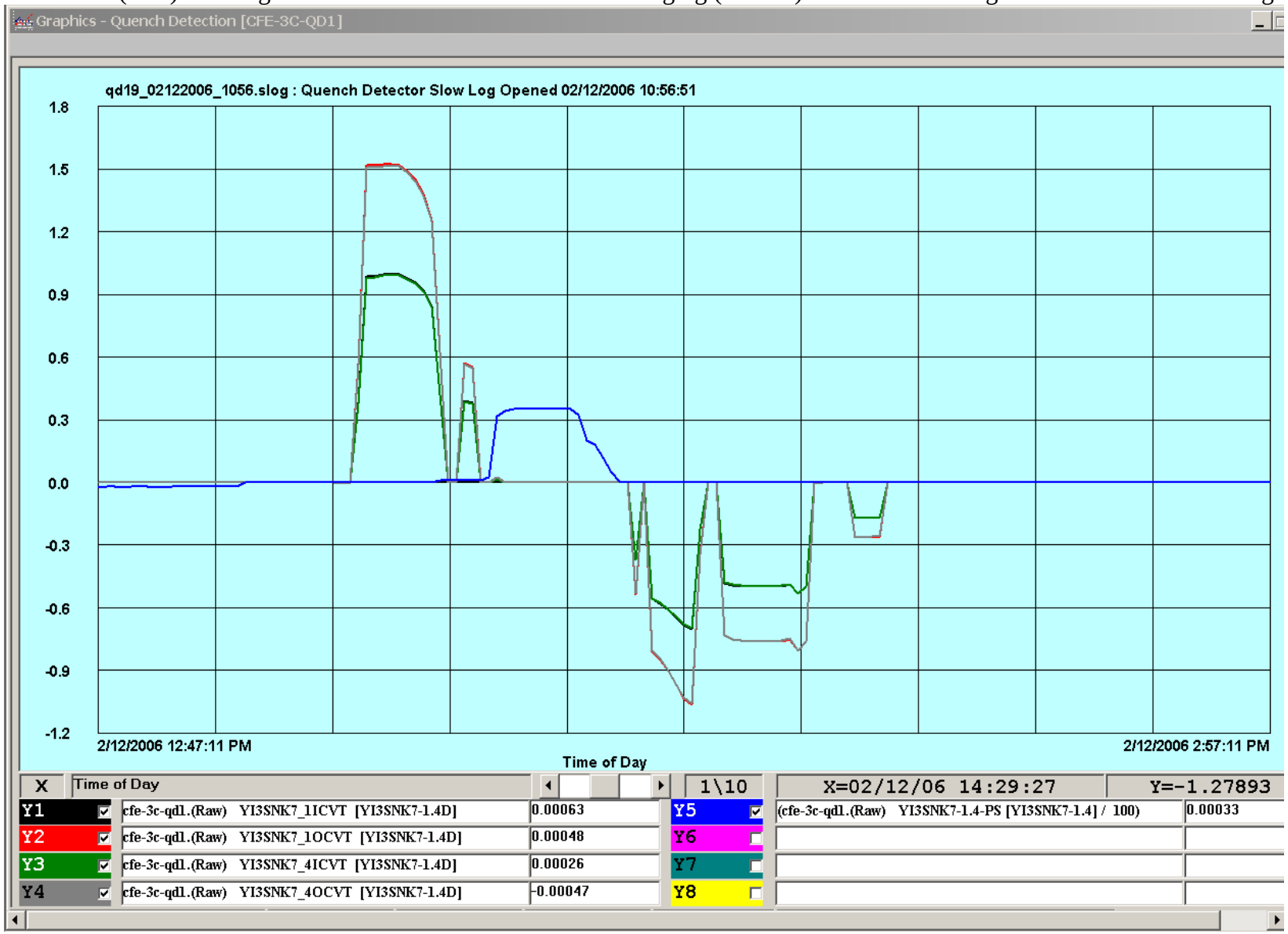


bo3-snk7-2.3-ps



yi3-snk7-1.4-ps Example of a problem

I don't have any slow log plots to show for yi3-snk7-1.4 or yi3-snk7-2.3 because they were not correct in the quench detection data base this year. There were fixed on 2/22/06 but I don't have slow log data for when they were ramped one at a time. I can show what a problem looks like though because of this. The current (blue) and coil voltage taps should not look like. Observe there is voltage when the current (blue) is sitting at zero or when the current is not changing (di/dt=0). There is no voltage when the current is changing.



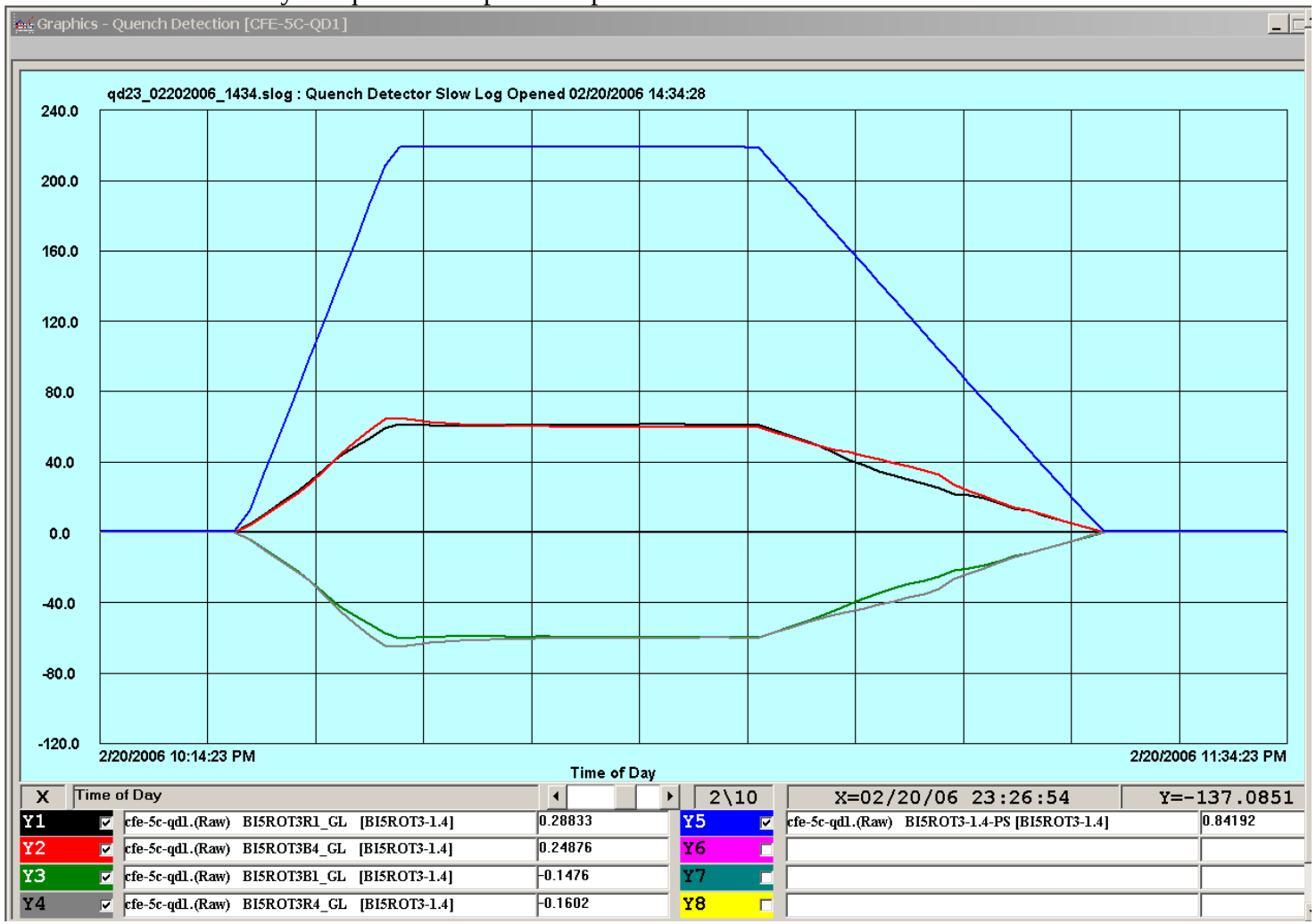
Alcove 9C-Slow Logs

Bi9-snk7-1.4-ps, bi9-snk7-2.3-ps, yo9-snk7-1.4-ps, yo9-snk7-2.3-ps

I don’t have slow log data for these because either the slow logs were not on or the slow log data I have is only when both were ramping to high current at the same time. Check slow logs 2/5/06-2/10/06.

An example of what Gas cooled leads look like on Slow Logs for bi5-rot3-1.4-ps. Here we are looking at bi5-rot3-1.4 gas cooled leads as an example. See the way they act like a resistor. The current goes up, the voltage on the gas cooled lead goes up. The current flattens out and the voltage on the gas cooled lead flattens out and sits at a DC level. Using the rules form page 2,

a. the B1 and R1 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current.
b. the B4 and R4 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current
c. When you ramp down the p.s. the gas cooled leads should follow, check this too.
d. You should also watch that the voltage on the gas cooled leads are not slowly, or quickly, drifting up, when you are sitting at a fixed current. This could indicate a lead flow problem. If the flow is low the voltage would climb and eventually the qd would trip out the p.s.



An example of what Gas cooled leads look like on Slow Logs for bo3-snk7-1.4-ps. Here we are looking at bo3-snk7-1.4 gas cooled leads as an example. See the way they act like a resistor. The current goes up, the voltage on the gas cooled lead goes up. The current flattens out and the voltage on the gas cooled lead flattens out and sits at a DC level. Using the rules form page 2,

a. the B1 and R1 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current.
b. the B4 and R4 gas cooled leads are opposite sign but equal and increasing only as you are ramping up in current
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